

Indian Agricultural Research Institute, New Delhi

I.A.R.I. 6.

GIPN-54-3 IARI/56-28-5-57-4000.

## UNITED STATES DEPARTMENT OF AGRICULTURE

ARTHUR M. HYDE Secretary

# YEARBOOK OF AGRICULTURE 1932

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66214

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON: 1932

For sale by the Superintendent of Documents, Washington, D.C.

## Organization of the United States Department of Agriculture

#### Corrected to April 15, 1932

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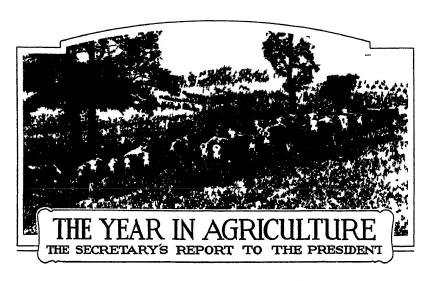
#### FOREWORD

NHROUGHOUT the civilized world agricultural research is largely a public function. It is so because few individuals or even corporations have the scientific interest, the public spirit, the money, or the personal incentive to do it well. As a private enterprise, it generally does not pay, principally because the benefits can not be monopolized but must be shared with the community. Publicly conducted, however, it pays large dividends. Not to carry on agricultural research would mean neglecting one of the greatest sources of private and national wealth. (This sounds like a truism, but it is apt to be forgotten in a period of depression such as that through which we are now passing. It may be supposed that the worth of agricultural research should be judged by the prevailing level of agricultural prosperity. That supposition leads to the conclusion that farm research should be slackened whenever profits fall. One might as well say that an army should drop its weapons at the first reverse. (The fact is that agricultural science is never more valuable than when the battle is going against agriculture. It is indispensable at the first line of defense the cost-of-production line. Agricultural science shows farmers how to reduce their costs not only in production but in marketing. It is at once their protection against excessive loss and their best guaranty of renewed prosperity when the tide turns. Research that lowers production costs is not hostile to production control. True, more units may be produced when unit costs are lowered unless farmers take steps to prevent that development. But they can and should take such steps. Lower costs and production control are not antagonistic but complementary aims. (The United States Department of Agriculture is primarily a research institution, with correlated service functions. It presents in this Yearbook, in short popularly written articles, a partial account of its most recent results. For a full accounting ten such volumes would be required. It would be truer to say that a full report, certainly a full report each year, is impossible, because the Department's work is a continuous activity rather than a set of isolated projects pigeonholed in calendar years. What is discovered one year is not necessarily applied at once, though it has a practical application eventually. (The information contained in this volume, though constituting only a sample of the Department's latest discoveries and conclusions, bears witness to the practical value of what the Department does. It is a cross section of an immense structure of growing knowledge, cut so that the reader may infer the shape and character of the whole. The volume is the sixth in a series similarly organized. Each article is the work of a specialist. (Besides miscellaneous articles published under the heading "What's New In Agriculture," the Yearbook contains groups of articles on important themes. It includes also the Secretary's report to the President and a section giving the most significant agricultural statistics.

> Arthur M. Hyde, Secretary of Agriculture.

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WASHINGTON, D. C., November 14, 1931.

To the President:

#### WORLD INFLUENCES UPON AMERICAN AGRICULTURE

American agriculture is not a separate, but an integral part of the world's economic system, and it is always deeply affected by financial, industrial, and social conditions at home and abroad. It is more affected by foreign conditions than is American industry, because it depends more heavily on the foreign market. When any country, from year to year, has an exportable surplus of a commodity or group of commodities, the prices realized for the export surplus determine the prices obtainable for the whole supply. In the last decade the United States has exported about 13.2 per cent of its agricultural production, and this trade has constituted approximately a third of our total exports. This third, it should be noted, represents only primary agricultural products in their raw or first processed form, such as wheat and wheat flour, and cotton. It takes no account of many agricultural products that are elaborately manufactured and exported as manufactured goods. Cotton manufactures, leather manufactures, numerous chemical products, and many other commodities are excluded. Forest products are excluded also.

Certain branches of agriculture, notably wheat growing and cotton growing, rest far more heavily on the foreign market than do our manufacturing industries. In short, our export trade in farm products brings a large part of the agricultural industry under foreign-market influence. The proportion of agricultural production which is exported is nearly twice as large as the proportion of industrial production exported. Agricultural prosperity in the United States, therefore, depends enormously on the purchasing power of the foreign market. When there is unemployment, a falling price level, and financial disorder in the countries that take our agricultural surpluses, American

agriculture feels the shock of a major depression. Its domestic as well as its foreign market is impaired because reduced foreign buying power means reduced industrial exports and therefore reduced domestic buying power.

These conditions are vital as long as we maintain our present level

of agricultural production.

Our agriculture is burdened with surpluses. This has been repeatedly, and, in fact, almost continuously the case since the war. The burden is specially heavy now, not primarily because of great increases over normal production, but as a result of great changes in the demand for our products. The present season, as compared with other postwar years, is one of average total production. Had demand conditions remained as they were in 1929, the output in many lines presumably would have been absorbed without disastrous price recessions. Demand has declined to such an extent, however, that many branches of our agricultural industry lack a profitable outlet. Lines that were materially overexpanded before the crisis are in desperate straits now. When supply already exceeds requirements, a sharply falling demand makes it intolerably burdensome.

Why has agriculture's surplus problem become thus aggravated? And from what source or sources may relief be expected? Correct formulation of agriculture's basic problems is essential, for mistaken diagnoses lead to mistaken policies, public and private. Concretely the issue is whether agriculture faces a temporary or a permanent change in its general market situation. In either case, changes in its production will be necessary. But the kind and degree of these necessary changes should be determined by market trends. Explicitly our farmers will have to decide whether it will pay to produce as heavily for export as they have recently. This is the critical point because, as already noted, the foreign market exercises a decisive influence upon the profits of several major branches of American agriculture.

#### Relationship to European Market Changing

Our dependence on the foreign market arises, of course, from the fact that American agriculture was evolved largely as a source of supply for an expanding industry in other countries, particularly in Europe. In the last two decades this relationship has changed vitally. Changes no less important impend. American agriculture must adjust itself thereto, if it is to be prosperous. Many factors are involved. The most important, as already indicated, is the influence of the foreign market on prices both at home and abroad. Scarcely less important are long-time trends in foreign-market requirements, foreign purchasing power, and foreign competition. International relationships in industry and trade, as well as in agriculture, enter the situation. In former years mutually profitable exchanges between Europe and the United States were possible because this country needed Europe's industrial products and could take them in exchange for grain, meat, and fibers. But our own industry has grown beyond the needs of our domestic market. To-day we wish to export rather than to import industrial products. Furthermore, Europe now has other sources to which it can turn for agricultural goods. It is poor business to shirk facing such facts. Farmers should understand them because exceptional circumstances, most of them an outgrowth of the war, have stimulated our export trade in agricultural products far beyond the level to which it would have tended had the war not thrown events out of their natural course.

Main trends in our changing relationship to the foreign market can be described briefly. In the nineteenth century the relationship of American agriculture to its foreign market was favorable. From 1870 to 1898 our agricultural exports, particularly in cereals, livestock products, cotton, and tobacco, mounted tremendously. These commodities went chiefly to the thriving industrial nations of Europe, whose growing populations became dependent on outside sources of supply. Excluding forest products, our agricultural exports rose from about \$297,000,000 in 1870 to more than \$840,000,000 in 1900. Expressed in an index of volume using the period 1910–1914 as 100, the export index number for 1870 was 25. For 1900 it was 122. The highest point was reached at 136 in 1898. Then a decline began that continued until the World War. We were approaching a balance between the domestic supply of, and the domestic demand for, agricultural products.

It is significant that the most prosperous period of American agriculture was not the era of rising exports, which in fact included years of ruinously low prices. Rather, the period (1898–1914) of declining exports was the prosperous time. Though we can not say that the decline in exports was the cause of the rise in prices, it obviously proved compatible with the advance. Agricultural prices rose more than the prices of other goods, and the rise was reflected in a rapid and steady increase in agricultural wealth. The average valuation of farm real estate in the United States doubled from 1900 to 1910, and the gain

continued at an increasing rate until the war.

## Why Farm Exports Dropped Before the War

Our agricultural exports declined before the war for two principal reasons. In the first place, they declined because the United States market increased. Growing consumption at home more than compensated for the decline. Our population increased from 73,000,000 in 1898 to 98,000,000 in 1914, and became more concentrated in cities. The standard of living advanced. Our national wealth, according to the census, increased from \$88,500,000,000 in 1900 to \$186,300,000,000 In the same period wealth per capita of the population rose in 1912. from \$1,165 to \$1,950. This was a period of rising prices, hence the gain in real wealth was somewhat less than the indicated gain in money It was substantial, nevertheless and brought about a more rapid increase in our consumption than in our production of the principal agricultural commodities, though this production increased rapidly. Accordingly agriculture had favorable supply and demand relationships despite its loss of ground in the foreign market.

In the second place, our customers abroad turned increasingly to other sources of supply; to Canada, Argentina, and Russia for grain; to Argentina for meat; to Australia and New Zealand for sheep and dairy products. Foreign countries, with cheaper land and most of them with cheaper labor, were competing with us in the importing markets. Countries in the pioneer stage of agricultural development had advantages comparable to those enjoyed by the United States in its earlier history. In consequence, our farm-commodity exports, including cotton, dropped about 36 per cent from 1898 to the period 1910–1913.

#### Trend Reversed in War Period

This whole situation, which seemed to promise stable prosperity for agriculture, was profoundly altered by the war. Our agriculture was expanded to meet war-time needs, and the trend toward a lessening dependence upon the European market was speedily reversed. When the war eliminated Russia from international trade in agricultural products and reduced the production of most European countries it gave an immense impulse to production elsewhere. United States, Canada, Argentina, and Australia the cereal acreage in 1921 was nearly 20 per cent greater than before the war. Canada's wheat acreage more than doubled. Pork production in the United States, beef production in Argentina, and dairy production in Argentina and New Zealand were tremendously stimulated. By 1918 our own farm-commodity exports, including cotton, reached a point 45 per cent above the pre-war level. More American beef, pork, and cereals were exported to Europe than were sent there at the height of our agricultural export trade in the nineties. From the standpoint of our permanent agricultural interests, this was a hazardous development, which left us with enormous surplus-production capacity.

Surplus production persisted long after the need that called it into existence had passed. Though our agricultural exports decreased in volume after the war from 145 per cent of the pre-war level, the high point reached in 1918–19, to 104 per cent of the pre-war level in 1923–24, they advanced to 136 per cent of that level in 1926–27. In the crop year 1929–30 the volume of our agricultural exports was 97 per cent of the pre-war level. Many products, however, were still exported in volumes much exceeding the pre-war averages. Our net exports of grain and grain products in 1929–30 had declined greatly but were still 130 per cent of the pre-war level. Exports of cattle and meat prod-

ucts remained above the pre-war level.

## Effective European Demand Overshot

Even had Europe regained its pre-war purchasing power it would not have been a profitable market for all the surplus farm production we had to offer. For one reason, other countries were offering large surpluses there, too. In 1921 exports of pork from all the principal surplus producing countries were 80 per cent greater than before the war. Total exports of beef from the surplus countries were 63 per cent greater than before the war, of butter 104 per cent greater, and of cheese 30 per cent greater. At the same time, Europe was restoring its domestic agriculture. Recovery came first in Denmark and the Netherlands, which were disturbed by but not directly involved in Next, the former warring nations of Europe increased their By 1927 the cultivated area of Europe, outside Russia, was back to 97 per cent of the pre-war average. Europe's production of milk, butter, cheese, and pork was above the pre-war level. By 1930 Russia had resumed the exportation of cereals and other agricultural products. In such circumstances even a prosperous Europe would probably have desired less of our farm production than it took before the war. In the hard conditions of the postwar period, it desired True, it took large quantities; but it did so at bargain prices, which returned little or no profit to our producers.

The war, in short, left American agriculture excessively dependent on the European market. Europe's capacity to take American agricultural goods depends essentially on three factors: Its purchasing power, the volume of its own farm production, and the quantity of farm production available to it from other sources. When we compare Europe's present condition with its pre-war prosperity, and consider also the increased competition our farmers meet there, it is obvious that our agricultural exports are still too large. In the contraction of our farm exports from 1900 to 1914, American farmers, as already noted, suffered no harm. They suffered acutely from the decline after the war. This contrast is easily explained. In the prewar period our farm production, though it steadily increased, did not increase more than the total market, domestic and foreign. In the postwar period, on the other hand, the production increased much more rapidly than the market, and corresponding increases took place in other agricultural countries. As a result of technical progress, farm output per man engaged in farming in the United States jumped about 15 per cent between 1919 and 1924, and it has increased since. Meantime acreage has increased. Yet not only the foreign market, but the domestic market has weakened, partly because the population is increasing less rapidly than formerly. In the present downward trend of our agricultural export trade, the home market has relatively more slack to take up than it had before the war, and less capacity to do it. Hence the favorable supply and demand relationships that existed then can not be restored without sweeping adjustments in production.

Export Decline Retarded by Credits

This country's agricultural exports to Europe after the war would have fallen more had not the trade been supported by a liberal credit policy. It depended extensively on American capital loans. Nearly half the \$10,500,000,000 loaned by the United States Government to foreign governments was loaned after the war. Loans by private investors after the war came to nearly the same sum. All told, American capital loans to foreign countries, mostly European countries, between 1914 and 1930 aggregated approximately \$23,500,000,000. These advances financed an export movement of industrial as well as of agricultural goods, but in the trade with Europe the agricultural goods predominated. Even with its purchasing power thus augmented, Europe was obliged to curtail agricultural imports. It raised tariffs and adopted milling restrictions to limit dependence on grain imports. It substituted vegetable for animal fats and oils. When in 1929 the stream of American credit to Europe dwindled, Europe was forced to cut its agricultural imports still more. Europe's credit difficulties have reacted vitally upon our agricultural export trade, which can not continue as if nothing had changed.

#### Monetary Factors in the Depression

Still another aspect of the international credit situation reacts adversely on our agricultural export trade. Before the war the United States was a debtor country, and foreigners owned much of the capital invested in our factories and farms. Our chief creditor was the United Kingdom; other countries, however, had substantial investments in the United States. It was necessary for us to pay

interest on the borrowed capital and to liquidate some of the principal. This was accomplished chiefly by the exportation of goods. Our debtor status, in its later stages, produced a heavy balance of United States exports over imports. This did not embarrass the creditor countries because in effect they had paid in advance for much of what we had to send abroad. It is different now. In the war period we paid off our debts and became a creditor country. As a consequence our balance of exports over imports, though it continued, became utterly changed in character. Instead of being a net addition to the current income of the principal importing countries, it was a charge against their future income. It put them in a fiscal position similar to the one from which the United States had emerged. It obliged them to work toward exporting more than they imported. Since they found it difficult to increase their exports, they had to cut down their imports. This necessity will continue as far ahead as we can see. can not, for obvious reasons, be met as easily as the United States met a similar necessity when this country occupied a debtor rôle. For one thing, the United States does not need what Europe produces as urgently as Europe formerly needed what this country produced. In other words, the Old and the New World are now less favorably placed to exchange goods and services. Each hemisphere is well developed industrially, and deficits are substantial only in Europe's agricultural wants. True, these deficits must be met. But whether they will be met in ways advantageous to the farmers of the United States is a question. Since we do not require Europe's industrial surpluses, Europe may be forced, in large measure, to do without our agricultural surpluses.

Another factor in our agricultural problem lies in Europe's monetary disorders. When Great Britain and other countries resumed gold payments in 1925 and 1926 they released forces that redistributed the world's gold supply. Surpluses accumulated in creditor countries while debtor countries ran short. When gold-standard countries have insufficient gold, they contract their currencies and credit. This causes prices to fall. American agriculture would have been hurt even had it avoided expansion in production. But this should not blind us to the additional handicaps that result from unrestricted production. It is difficult to measure the relative influence of the monetary and the nonmonetary factors in the present crisis. Both, however, are important. Agriculture's attention is properly centered upon the latter because they are measurably within its control. Unless production is adjusted, low agricultural prices will continue after Europe's

money troubles are remedied.

The part played by general deflation in the agricultural depression has caused some persons to declare that underconsumption rather than overproduction is the main trouble. This is a distinction merely of words. The surplus is the important thing. Whether created by overproduction or enhanced by underconsumption, the supply controls.

Two Fundamental Requirements

The situation has two fundamental requirements. First, the credit and purchasing power of Europe must be restored. This is essential not only for European welfare but for our own, because we shall need the foreign market indefinitely for some of our products. Second, American agriculture must adjust itself to a declining export trade.

As things stand, this need will persist, no matter how favorably matters develop in Europe, because our production is overexpanded in relation to Europe's wants. Should Europe's economic recovery be slow, the necessity for diminishing our farm exports will be the more pressing.

This is not a policy of defeatism, a passive acceptance of declining It is a policy of constructive adjustment to a radically changing market situation. What counts in agriculture is not primarily the volume, but the profitableness of farm production. It is better to contract the agricultural industry profitably than to overproduce Here is the challenge of the present situation. In a market that does not keep pace with the increase in production capacity farmers must adjust their production. If they do this by withdrawing the less productive acres and livestock, they reduce their surpluses and often also their costs of production. Thus they reap a double advantage. They get higher prices and also benefit from wider margins between prices and costs. This favorable margin can be increased by individual efficiency. I discussed the necessity of crop adjustments in my report last year (pp. 24-30) and need not repeat here what I then said. It is a gross error to suppose that efficiency in agriculture leads inevitably to overproduction. It tends on the contrary to promote a good adjustment between supply and demand, because it discourages wasteful competition. It is time to revise the crude notion that only a continually expanding agriculture can be a profitable agriculture. Expansion is justified only when the market is expanding too. When the market is declining or is not expanding at its former rate agricultural profits wait upon adjustment to the change. Effecting this adjustment does not mean abandoning the market to our competitors. It means producing for a real as distinguished from an illusory market, and supports the advantages this country possesses in natural resources, capital, and managerial ability.

This recommendation to reduce the volume of our agricultural exports does not challenge the ability of our farmers to meet foreign competition. They can produce, with or without tariffs, as cheaply as farmers anywhere. But to do so they would have to accept lower

living standards.

## Surplus Difficulties Largely Export Difficulties

Overproduction is not necessarily and invariably production for export as distinguished from production for the domestic market. It is possible to have an oversupply of goods that are essentially on a domestic basis, such as dairy products and wool, as well as of goods produced largely for export. Taking our agriculture as a whole, however, it is surely true that surplus difficulties are now largely export difficulties. The farm commodities that we sell heavily in foreign markets are those that are depressed most seriously. Wheat and cotton are conspicuous examples.

In urging an agricultural policy directed toward lessening our dependence upon foreign markets we do not ignore the relationships in which different leading products stand toward the export demand. With some products, such as cotton, we have natural advantages that give us competitive strength in international trade. With other products, such as wheat, our position is less advantageous. No uniform prescription can be given as to the place that different commodities should occupy in the export trade. But if a declining agricultural export

trade was compatible with American agricultural prosperity before the war, when foreign competition was relatively weak, and when foreign purchasing power was rising, it is much more in order now.

#### Rapid Shift to Domestic Basis Impracticable

The surplus-production capacity that American agriculture now has can not be quickly eliminated, and a sudden shift from an export to a domestic basis is not practicable. Some branches of our agriculture, moreover, can compete successfully in foreign markets, even against the pressure of world-wide overproduction. Exclusive of that grown in China, this country, for example, produces about 60 per cent of the world's cotton crop; the economy of specialization in cotton as a cash crop supplemented by home-grown food and field crops, gives many of our growers an advantage even in bad years. The tobacco situation is similar. Excluding Russia and China, the United States produces about 40 per cent of the world's tobacco crop and holds a dominant position in the international trade. It does not follow, however, that unrestricted production of these crops for the export market is warranted. Cotton and tobacco prices, as well as the prices of cereals and meat products, reflect foreign-market influences significantly. There is no profit in persistent overproduction for a declining foreign demand. Our producers may be able to stand the loss as well as any of their foreign competitors, but it is poor business to do so unnecessarily. They should grow the quantity of each crop that can be absorbed, with profit to themselves, either in the domestic market or the foreign market, or in both. When wheat sold at \$1 or more a bushel in western markets. thousands of producers could grow it profitably for export who can not do so at present prices. Their production in recent years has evidently been adjusted to the prices previously received. It could have been more desirably adjusted to price prospects.

With human wants still unsatisfied, overproduction seems an anomaly. Farmers, however, cannot produce for a market that can not buy. They must realize a profit. Agriculture throughout the world has persisted since the war in increasing its production beyond the purchasing power of the available market. This is competition run amuck. It brings no benefit in the long run even to the purchaser, because the distress inflicted upon agriculture hurts other industries, limits their markets and their profits, and forces them to lay off workers. Trade depression such as the world has gone through in the last two years emphasizes, though it does not create, the disparity between agriculture's production capacity and its market. It stresses the folly of production without reasonable prospect of a profitable sale. Agriculture can not shut down as manufacturing industries sometimes do when demand falls off; but this does not mean that agricultural production should continue to disregard market developments. Reducing farm production may often be difficult and sometimes costly, but its difficulty and its cost will certainly be less than that of continuing

production on a scale in excess of demand.

## Home Market's Importance Not Minimized

This is not an attempt to minimize the importance of the domestic market. We merely emphasize the influence of foreign conditions upon some of our principal crops. If a surplus must be sold abroad,

the price falls in the domestic market to a point at which foreigners will buy. This explains why foreign takings have a greater influence on prices than their proportion to the total supply would indicate. No device can be a remedy which tends to increase exportable surpluses. Actually to reduce these surpluses is the only logical course. They

can not be forced into unwilling markets.

There is a reverse side to the picture. American agriculture is not wholly on an export basis. Many of its products find a sufficient market within our borders. But this fact, though it may mitigate, does not destroy the influence of the export surpluses. Commodities that can not be profitably exported may sometimes be substituted at home for products not ordinarily exported, as when wheat replaces corn as feed for livestock. In this way the market for commodities usually on a domestic basis is weakened. Furthermore, slow export trade may prompt farmers to shift their crops so that overproduction may result in crops ordinarily produced exclusively for home consump-Thus export surpluses tend to weaken the whole structure of agricultural prices. In such conditions an expanding home market lacks the beneficial influence it would otherwise have. No one can tell what the ultimate position of American agriculture in world trade will be. Developments not now foreseen may change matters radically. New foreign markets may be developed, and old ones may be recaptured through technical progress. Present conditions, however, certainly indicate that smaller production for export would mean a more profitable American agriculture.

#### The Influence of the Tariff

As we produce less for export, the tariff on agricultural products will become more effective. Agriculture will benefit in two principal ways. It will share in the results of a better adjustment of world production to world demand, and will have a stronger, more sheltered domestic market. Tariff protection is of course indispensable to this latter result. Prices can not be higher at home than abroad unless tariffs stand between the domestic and the foreign market. Tariff protection for agriculture is part of our national policy. There is no reason to fear that it will be discontinued. It is already effective for many crops formerly governed entirely by the world market, and covers a progressively larger proportion of our agricultural output. The advantage is not confined to crops definitely and permanently on a domestic basis. It extends to crops still produced substantially for export, because it lessens the incentive to produce these crops in excessive quantities. Farmers have an increasing number of sheltered crops to which they may turn.

The tariff act of 1930 accorded well with agriculture's needs, both present and future. It increased the rates of duty on agricultural products about 30 per cent. This change, besides strengthening the home market for many products already on a domestic basis, enabled farmers to put additional products in a similar position. The new rates helped agriculture materially. Practically all our agricultural imports, both dutiable and free, declined under the influence of the depression. But the dutiable imports declined much more than the free imports. In the 12 months following the passage of the act our imports of dutiable agricultural products fell off by 33 per cent, whereas our imports of duty-free agricultural products declined only 7 per

cent. This difference was clearly, in large part, a result of the new tariff. The world's difficulties would not otherwise have caused so unequal a decline. Had the new tariff law not been in effect, world competition would have been felt by our farmers disastrously in the

domestic as well as in the foreign market.

No fiscal policy can guarantee agricultural profits in a time of depression. A tariff is justified if it diminishes losses. By this test the tariff act of 1930 is already a demonstrated benefit. Its benefits should be substantial when economic conditions once more become normal. The tendency, then, as has already been indicated, will be toward increased dependence on the home market. As export surpluses diminish, American standards will become effective on a steadily lengthening list of farm commodities. Agriculture and manufacturing industry in the United States are exchanging rôles in relation to the world market. The former is becoming less and the latter more dependent on export trade. Only the tariff can make this change beneficial to agriculture. On a long view its potential advantages far outweigh its present advantages, substantial though these are.

#### HOME MARKET AND FARM INCOMES

When surpluses can not be sold abroad they pile up at home. Economic depression abroad can throw many branches of our agricultural industry into distress; when such depression is associated with like

conditions in the United States, all agriculture is affected.

In the last year the domestic demand for farm products has declined to an extent rarely before equaled in so short a time. This is mainly traceable to changes in the level of industrial activity, which changes are the most important single cause of fluctuations in the home market for the agricultural goods. In the 1929–30 season industrial production in the United States fell about 20 per cent below the level reached in the preceding year. A further decline of nearly 20 per cent took place in the 1930–31 season.

Money incomes of factory workers declined more than the volume of industrial production. This reduction, besides involving an enormous cut in the purchasing power of wage earners, reflected a decline in the buying power of other urban groups, since it betokened reduced industrial profits. Wholesale and retail trade and the professions were damaged proportionately, with bad effects upon the farmers' markets. Some groups with more or less fixed money incomes found their purchasing power increased through falling prices, but the trade slump caused a heavy net drop in the purchasing power of the Nation as a whole.

#### Agricultural Prices Decline Most

Trade depression invariably causes agricultural prices to fall sooner and lower than the prices of other goods. This tendency, which was painfully in evidence in the depression of 1921, received a new demonstration in 1930 and 1931. In a general price decline such as that which has affected practically all commodities in the last two years, agriculture would be injured even had its prices not fallen more than those of other economic enterprises. Falling prices always mean falling profits, since costs of production never decline proportionately at once and usually not for a long time. The injury to agriculture is greatly increased by the excessive degree to which farm commodities

have been affected. Special interest attaches to this aspect of the problem because it suggests part of the remedy. When agricultural prices fall more than other prices, the fact shows, among other things, that agriculture is having more difficulty than other industries in readjusting its production.

#### Causes of the Disparity

Such disparities tend to disappear as business revives. Farm prices which fall faster in depressions rise faster in recoveries. The disparities arise in periods of depression from the fact that farm production is not easily or quickly adjusted to market changes, whereas the output of many nonagricultural commodities is adjusted promptly. In agriculture, production continues to overshoot demand; in industry, on the other hand, the maladjustment between supply and demand shows itself in unemployment rather than in a persistent accumulation of commodities. Hence, agriculture is penalized unavoidably. Its readjustment difficulties are intensified by the fact that other economic enterprises solve such difficulties by methods that weaken the farmer's market. Another factor in widening the spread between agricultural and nonagricultural prices is the difference in competitive conditions in agricultural and in industry. The prices of practically all agricultural products reflect changes in demand conditions quickly. On the other hand, the prices of many nonagricultural products are more or less customary, and depend largely on elements other than those springing from the immediate business situation. Then, too, agriculture is handicapped by relatively great difficulty in reducing its overhead costs. All these circumstances are finally expressed in a lagging agricultural adjustment to the diminishing market. Crop shifts take place, but agricultural production as a whole tends to be maintained. Our total acreage this year is about the same as it was last year; on this acreage we are producing surpluses that demoralize the markets and return no profits to farmers.

Price changes, absolute and relative, are not the only factor in determining farm incomes. It is necessary to consider also the volume and the cost of production. Fairly comprehensive statistics are available as to the volume, but not as to the cost of production, which

varies greatly on different farms and in different regions.

#### Gross Returns From Farming

Some measure of the decline that farm earnings have suffered in the last two years is afforded, however, by data available as to the gross return from agricultural production. Gross income from the agricultural production of the United States for 1929 was about \$11,911,000,000, and in 1930 about \$9,347,000,000. It is not yet possible to state the gross income from the farm production of the current season. On the basis of figures heretofore available it may be less than \$7,000,000,000. The recent upturn in prices will of course affect the estimate.

At this writing (November, 1931) some of the principal crops are not yet completely made, and the marketing season has several months to run. Certain broad conclusions are indicated. Thus, in the first eight months in the calendar year livestock and livestock products were marketed in about the same volume as in the corresponding period of 1930, but the prices were very much lower. On October 15,

1931, the prices received by farmers for this group of commodities averaged 36 per cent below those of the corresponding date in the previous year. The prices of dairy and poultry products were 21 per

cent lower.

In 1930, the last year for which complete data are available, gross income from grains was only \$760,000,000, as compared with \$1,281.000,000 in the previous year. Gross income from cotton dropped to \$748,000,000, as compared with \$1,389,000,000 in 1929. Income from meat animals was about \$2,455,000,000, as against \$2,817,000,000 in 1929. All livestock and livestock products brought a gross income of \$5,296,000,000, or about 15 per cent less than in the previous year. The corresponding reduction in the income from field crops was about 48 per cent. Net income from agricultural production in 1930 declined proportionately more than the money incomes of factory employees and considerably more than the incomes of certain other groups.

Net returns to producers, which are what is left after deducting the expenses of production, unquestionably declined proportionately more than the gross returns. In field crops, prices declined proportionately much more than the production increased. Grain production is only moderately greater than it was last year, yet grain prices on October 15, 1931, averaged about 50 per cent below those of October 15, 1930. Cotton production is about 22 per cent greater than in 1930, yet cotton prices on October 15 were 45 per cent lower than on the corresponding date of the previous year. The production of fruits and vegetables increased somewhat; the prices of these commodities averaged about 45 per cent lower. At the prevailing price levels, the year's increased volume of production not only failed to prevent the gross farm income from declining below that of the previous year, but did not prevent it from falling below that of the depression year 1921.

#### Effect on Net Incomes

Some small compensation for price declines has come to the farmers during the last few years in the shape of reduced production costs. In 1930, and to a still greater extent this year, necessary expenditures for labor, fertilizer, farm equipment, machine supplies and repairs, and feed and seed declined. Farm wages and prices of the goods used in farm production were about 15 per cent lower this fall than last fall. As already indicated, however, the expenses of farm production tend to decline less rapidly than the prices of farm products. Against a 15 per cent drop in certain leading farm expenditures, it is necessary to set a possible 25 per cent drop in gross farm income in 1931. Furthermore, not all the reductions that take place in farm expenses go on the credit side of the agricultural ledger. Feed and seed, for example, are bought by some farmers and sold by others. Thus gain to one group is offset by loss to another. Savings on labor, machinery, oil, gas, tires, etc., are, of course, actual net savings to agriculture. They do not suffice, however, to offset the tendency of other farm expenses to remain fixed in time of depression. Taxes do not fall with farm-commodity prices nor do interest charges and principal on mortgage debt. When the purchasing power of farm commodities falls as much as it has since 1929, the proportion of the farm output that must be surrendered in payment of taxes and principal and interest on loans increases. Perhaps the heaviest burden that depression puts on agriculture is the difficulty it creates in meeting fixed charges.

Reductions in the expenses of production have not nearly sufficed to counterbalance the drop in gross incomes. Hence the net income of the farmers from the production of 1930 declined proportionately more than the gross income. It fell short of providing a wage allowance for the farm operator's labor at going farm-labor rates, and left no net income whatever available for the farmer's capital or management.

#### Adjustment to Main Trends Imperative

Agriculture, if it is to be continuously profitable, must be adjusted to long-time trends. This fundamental requirement is far more important than the need to vary farm output with temporary market changes. It is desirable, of course, to match temporary market shifts with corresponding adjustments in output. It is imperative to make adjustments to long-time changes. When main trends turn against agriculture, the penalty for failing to adjust output is disaster. It does not follow, simply because a certain volume has been absorbed not unprofitably for a number of years, that a sound balance has been struck. Possibly the production has been continued for a market essentially precarious. This is potential overproduction which may turn suddenly into actual overproduction. Even when business becomes active again, a brake will have to be kept on some branches of American agriculture.

#### CROP ADJUSTMENTS MADE BY FARMERS

Extensive crop shifts have been made by the farmers of the United States in recent years. Unfortunately these shifts have not gone far as yet toward adjusting production to consumer demand. Contraction in some regions has been offset by expansion in others, particularly in wheat and cotton. On the whole, expansion has exceeded contraction. This is so plainly against the interests of the farmers that careful study of the question is necessary to indicate how crop adjustments may be better engineered. The best way to see what is required is to

note the results of what has already been attempted. Net farm incomes have been so low since the war that the farmers might have been expected to reduce their acreage. Instead they increased it. In 1930 the United States had 366,500,000 acres in crops, the highest total on record. This was an increase of 55,000,000 acres since 1909. Lessening demand for farm products, at home and abroad, and repeated warnings against overexpansion did not prevent the 1930 crop area from increasing 2,000,000 acres over that of 1929. The increase over the 1909 figure is specially remarkable since the last 12 years saw a decline of about 8,500,000 head of horses and mules on farms and a consequent release of approximately 20,000,000 acres (not including pasture) formerly required to produce feed for work stock. Land thus released, which previously produced raw material for animal power, now produces foodstuffs for the market. Wheat acreage, which rose from 44,262,000 acres in 1909 to nearly 75,694,000 in 1919, dropped after the war to 52,535,000 acres in 1924, but rose again to 61,464,000 acres in 1929. The acreage for harvest this year, despite the low prices that prevailed for wheat during 1930, was reduced only about 6 per cent below the 1929 level.

#### Regional Changes Conflict

Regional aspects of the wheat-acreage problem show the difficulty of getting concerted action when reduction is desirable. In the region east of the Mississippi wheat acreage dropped from about 18,000,000 acres at the close of the war to about 11,000,000 acres in 1930, or to a point below the pre-war level. West of the Mississippi, however, tremendous expansion occurred, particularly in the southwest winter-wheat States. Kansas's wheat acreage this year is estimated at 12,572,000 acres, as against 4,810,000 in 1911. Montana last year harvested 4,000,000 acres of wheat, as compared with less than 1,000,000 acres in 1914. The aggregate wheat acreage of Colorado, Nebraska, Texas, and Oklahoma in 1930 was 11,400,000 acres, as compared with about 7,800,000 acres in 1914. Reductions in the East, where farmers can turn to other crops, were more than offset by increases in the West where crop shifts are difficult.

Equally striking is the way in which cotton acreage reductions in one region were offset by expansion in another. In the old Cotton Belt, where the boll weevil did heavy damage in 1921, 1922, and 1923, cotton as the principal cash crop was wiped out in some sections, and some cotton land went entirely out of production. In the weevilinfested area generally cotton was widely replaced by feed crops and pasture. In the cotton States east of the Mississippi the acreage in truck crops increased, from 1919 to 1930, about 154 per cent. West of the Mississippi, particularly in Texas and Oklahoma, the cotton area increased greatly. Texas and Oklahoma together had 23,000,000 acres in cotton in 1926, as compared with 12,900,000 acres in 1919. This year the cotton acreage in these two States is about 3,500,000 acres below the 1926 figure. Our total harvested cotton area in 1930 was 45,218,000 acres, as against 33,566,000 acres in 1919.

#### Corn Acreage Remarkably Uniform

Our corn acreage has been remarkably uniform at about 100,000,000 acres for several years. Though the acreage in corn this year is the largest since the record acreage of 1917, it is only 8.6 per cent above the lowest acreage in the last quarter of a century. Corn acreage is relatively stable because the crop returns a comparatively large gross income per acre under a wide range of climatic conditions. Nevertheless, regional adjustments take place. Corn has moved west and north in the last decade. A reduction of about 5,200,000 acres east of the Mississippi has been offset by an increase of about 7,800,000 acres in Minnesota, North Dakota, Iowa, South Dakota, and Nebraska.

Flax acreage increased from 1,113,000 acres in 1922 to 3,692,000 acres in 1930, to some extent at the expense of wheat and grass. The production of truck crops and vegetables (not including potatoes) has increased at an average rate of about 10 per cent a year since 1921, though in the last few years the outlook for these crops has not been satisfactory. Vegetable and truck-crop production, however, can be increased greatly without drawing much land from other crops.

When major crops are overproduced, the difficulty may be mitigated but can not be overcome for the country as a whole by changing to minor crops. Six major crops have a combined acreage which usually makes up more than 85 per cent of the total crop acreage. These crops are corn, hay, wheat, cotton, oats, and barley. Only about 46,000,000

acres, or less than half the area we devote to corn alone, is used for producing 70 or more minor crops. It is obviously impossible to change largely from the production of these major crops to the production of the minor crops without disturbing the market for the latter. Sizeable acreage adjustments among the major crops necessitate either changing from one major crop to another, abandoning crop land, or increasing the area in pasture. Shifting acreage in the major crops is practicable only when some of them are in short supply. Abandonment of acreage, though large in recent years, may be offset by expansion elsewhere. Returns from most pasture are relatively so low that a change from crops to pasture is a last resort where land is good. All the courses open are difficult, a fact which largely explains the tendency of farm production to stay above market requirements when demand falls. It is a tendency that must be combated if farm profits are not to vanish altogether in a period of rapidly falling prices. Temporary abandonment of farm land in extreme situations is preferable to farming it at a loss. The individual farmer faces many practical difficulties in adjusting production, as will be pointed out presently. The main problem is one of reconciling individual interest to group interest through concerted action of producers.

#### Adjustments in Livestock Production

Changes in the production of livestock can not be made as quickly as changes in the production of field crops, though the output of some livestock products can be changed quickly. Shifts in hog production mainly go in cycles, but depend on shifts in field crops, and also on changes in the use made of crops. Dairy expansion in the Eastern States in recent years has gone along with a decline in hog numbers in that area. On the other hand, hog production has increased where corn has replaced wheat and other crops. Hog producers have partly met the challenge of declining prices by increased efficiency both in swine sanitation and in the utilization of feed. In the beef-cattle industry, which has a long production cycle, adjustment to declining prices is extremely difficult. Since 1928 the number of cattle on farms has increased from 55,500,000 to 59,000,000, despite warnings that increased production would mean lower prices. The greatest increase has taken place in the North-Central States, where pasturage, roughage, and grain are most abundant. Production is at last being curtailed in the sheep industry, whose output expanded 43 per cent between 1922 and 1931. The expansion was general in all sheep-producing sections and continued despite numerous warnings that overproduction impended.

#### Outlook Service

Such facts show that attempts of farmers to shift their production to better paying lines are often confused and conflicting. Better facilities for concerted action are needed. Some progress has been made in developing such facilities. There is growing solidarity among farmers in the cooperative movement and in various other forms of organized effort. There is also rapid growth in the use of economic information as a basis for cooperative adjustments. The Department of Agriculture collects and interprets the data needed. This service deals not only with the supply of and the demand for various products, but also with farm-management problems. Too often farmers adjust their production on the basis of currently received prices or prices received in the

preceding year, apparently in the mistaken belief that similar prices will necessarily continue. This practice is a basic cause of cyclical fluctuations in production. Alternate expansion and contraction result

in wasteful crop and livestock shifting.

Farmers must take into account a complexity of forces in planning their production program. They can not supply themselves with the necessary information and its interpretation. This fact, and the public importance of adjusting production to demand, make the task of supplying outlook information a public function. The department began systematically to meet this need eight years ago, when it established an outlook service. The service has become a cooperative undertaking

between the department and State agencies.

It is planned in national, regional, and State conferences. The resulting information is made available to producers in all parts of the country, through published reports, press material, radio addresses, and direct contacts with farmers. In 1930 six national and regional conferences were held, with nearly 400 State specialists in attendance. Forty-five States issued special outlook reports supplementing the department's data and interpretations with information specially pertinent to particular States and local areas. Nearly 1,300 meetings were held for training local leaders in this work, as compared with 540 such meetings in 1929. Also 9,135 farmers' meetings, with an aggregate attendance of 601,000, were held to disseminate economic information, as compared with 4,240 such meetings with an attendance ance of 204,000 in 1929.

Economic information is meeting a rapidly growing demand in vocational education. In the last fiscal year approximately 95,000 farmers were enrolled in evening classes, as compared with 65,000 in the preceding year. Those in charge of this work in the Federal Bureau for Vocational Education cooperate with specialists in the Department of Agriculture. Economic material has an important place in the instruction.

Regional differences in soil, topography, and climate, and in other factors of fundamental importance in shaping types of farming and trends of production, are recognized by the department and the State agencies in their research and extension work. In farm-management investigations a beginning has been made in determining differences in types of farming and in organizing research into regional programs.

## Compulsory Adjustments Inadvisable

I have repeatedly emphasized the need for curtailing acreage and livestock breeding, and have urged that this be done by voluntary concerted action. This course seems preferable to the compulsory production control lately advocated in the cotton States. The doctrine that production can be better controlled by law than by the judgment and decisions of producers is probably repugnant to our Constitution and certainly repugnant to the character of our economic system. Production adjustments are more necessary now than they were a year ago. Appeals made then for voluntary concerted action met with an inadequate response. It has been inferred that voluntary action must fail unless supported by legal action. This does not necessarily follow. Acreage cuts and reductions in livestock breeding were relatively small last year, probably because farmers were not then convinced of their urgent necessity. The situation has changed so

much since that it seems impossible to doubt that they are convinced now. If they are, voluntary action should do what is required If

they are not, legislative action will meet with resistance

All plans for general cuts in production meet the difficulty that farm production costs vary on different farms and in different localities. Hence prices that mean loss in one place may permit profits elsewhere. Individual farmers can sometimes do business profitably at prices that ruin their neighbors. When prices fall, it is advisable for most farmers to reduce their output. But it never happens that they should all reduce their production to the same degree. Reductions should be adjusted to the necessities of individual farms, so that the higher-cost acres and animals will be withdrawn first. Blanket reductions, applying equally to all farms and all farmers, are not desirable because such reductions press equally on the efficient and on the inefficient farmers, and equally on good and poor land. This goes against the first law of efficiency.

Under the plan of voluntary adjustment, many individuals must agree on a common course before anything can be accomplished. Moreover, the equal participation of all areas and all individuals can not be assured, nor can an equal distribution of the resulting benefits. These are undeniable difficulties. Yet I think they are less serious than the difficulties that would arise from a compulsory control of production. Such a system would fail completely to allow for the different necessities of different farms and different regions. It would certainly be opposed. It would also be inflexible. Lawmaking could not keep pace with market developments at home and abroad. Eventually the control laws would be ignored. In so far as they were observed they would tend, far more than any plan of voluntary adjustments, to throw our crop system out of balance, because quick crop shifts would be largely ruled out. Arbitrary reductions in the acreage of one or two crops would divert excessive effort to other crops. Surplus difficulties would spring up in new places, under conditions tending to perpetuate them. With their initiative fettered, farmers would find remedial action difficult. Moreover, the proposals so far made for the legislative control of acreage are State or regional proposals, whereas our problems of agricultural production are essentially national. Regional action can do nothing not likely to be offset by opposite action in other areas.

#### Individual Readjustments

Many difficulties confront farmers who wish to promote regional crop readjustments. When an individual farmer has no assurance that the other farmers will join in reducing the acreage of a crop, he must try to establish the combination of crops and livestock that promises the most return on his own farm. When prices are very low, readjustments by shifting from one combination of cash enterprises to another do not produce significant increases in the farm income. Such readjustments, however, are not without importance, though they do not fully meet the emergency. Readjustments on individual farms may bring results (1) by increasing the noncash income of the farm family in food and feed crops and meat and other livestock products for use on the farm, and (2) by curtailing cash outlays. Extension workers emphasize the "live-at-home" type of farming. This is much to the point now. Through these two methods—pro-

duction of more commodities for direct use on the farm and modification of farm practice to save cash outlay—reduction takes place in the commercial output of farm products through the actions of the individual farmers. These adjustments are, at best, a painful process, which emphasizes the urgent necessity of avoiding or at least minimizing the price slumps in agriculture by voluntary adjustment through concerted action.

#### Efficient Methods Reducing Costs

Mechanization continues to reduce costs of production in agriculture. With modern equipment one man can now handle 160 or more acres in the Corn Belt, as compared with an average of about 80 acres only a few years ago. Two-row and four-row cultivators handle nearly two and four times as much corn as the old one-row cultivator handled. Two-row mechanical corn pickers, with two men to run them, do as much work as six hand pickers. Duck-foot cultivators and row weeders almost eliminate the necessity for plowing in the summer fallow wheat areas of the West, and increase materially the summer fallow handled by one man. In the Great Plains a 16-foot combine harvests and threshes 35 to 40 acres of wheat a day. One such harvester can handle 500 acres of grain in 15 days. In 1928 the cost of harvesting an acre in Kansas by the combine was about \$2.20, as compared with \$3.50 for harvesting with a header and thresher, and \$4.40 for harvesting with the binder and thresher. Nearly 66,000 combines were sold in the United States in the period 1927-1930. In Kansas the number of combines increased from 2,796 in 1923 to 16,631 in 1929. Combines are now used in every State in which small grains are of any importance. In the Mississippi Delta, with modern power machinery, only 30 to 35 hours of man labor are required to grow an acre of cotton ready to pick, as compared with 80 hours under the old 1 or 2 mule system. In haying, one man, with a tractor-drawn mower and a side-delivery rake, covers 25 acres a day, or fifty times the area one man could cut and rake a century ago. If the windrow needs turning, it can be done with the tractor and the side-delivery rake. Production costs are reduced also by the use of better seed and more fertilizer, and by the more scientific handling and feeding of livestock. In the Southeastern States yields of both corn and cotton have been greatly increased through the use of winter legumes.

## Long Life Probable for Family Farm

In certain areas mechanization has greatly increased the size of farms and the investment per farm. It has been suggested that this development may foreshadow an increase in corporation farming as distinguished from family farming. Mechanization, however, does not necessarily involve corporation farming or absentee ownership. It is quite consistent with the family-sized farm, though it may make that farm larger. Much interest has been manifested since 1920 in large-scale farming, corporation farming, "chain" farming, and the like. A few conspicuous developments have taken place. But the movement toward the consolidation of holdings and toward farm operations on a large scale has not gone far. For the present, the subject is interesting mainly in its potentialities.

Large-scale farming as yet is a very minor thing in American agricul-The capital value of all corporation farms that made income tax returns in 1924 was only 2.7 per cent of the total capital value of all the farms of the Nation. Some increase has taken place since 1924 in corporation farming, but the developments have not been spectacular. More remarkable is the change that has taken place since the war in the size of the family-farm unit, particularly in the Great Plains and in the newer cotton areas. The same tendency, though less pronounced, is evidenced in parts of the western Corn Belt. By enabling the family labor supply to cover more land, power machinery tends to conserve rather than to destroy the family-farm system. Long life is probable for the family-sized farm because the nature of farming does not admit of the standardization necessary to the economical employment of large labor forces. Farms have increased in size in the United States in recent years without any corresponding increase in the amount of human labor employed per farm, but rather with a tendency in the opposite direction.

#### CROPS OF THE YEAR

Fall rains ended drought in most of the States that were drought stricken in 1930. But the winter was remarkably dry. Precipitation was less than half the normal over a large central northern area between the Lake region and the Rocky Mountains. Snowfall in the western mountains was so deficient that the supply of irrigation water was much reduced. On many western mountains the stored snowfall at the end of the winter was the smallest in 20 years. Rainfall in the spring months was generally sufficient, except in the Dakotas and Montana and in some districts further west. Only about half the normal rain fell in the Dakotas and Montana during the three spring months. Some parts of the more western States fared little better. This was North Dakota's third and Montana's fourth successive year of subnormal moisture. Minnesota had a deficiency also. In fact, the moisture supply in that State has been somewhat deficient every year since 1919. Good spring rains fell, and favorable temperatures prevailed in the Eastern States from New England to the Gulf of Mexico. The central valleys, though somewhat drier than usual, had enough moisture for satisfactory crop growth. In parts of the South, particularly in the Southeast, the weather was too dry in June, and the moisture supply continued short in the Northwest and Western States. Elsewhere June weather was favorable, and crops made good growth. July brought general relief to many southern localities that had previously been short of moisture, and also favorable rains over a wide belt from the middle Mississippi Valley eastward to the Atlantic Ocean where the 1930 drought was most severe. In this area the contrast between July rainfall in 1931 and July rainfall in 1930 was striking. In some States it was several times greater this year than Weather conditions were unusually favorable for maturing and harvesting the winter-wheat crop. In the spring-wheat States, however, heat and continued drought took heavy toll of wheat and severely damaged cultivated crops and pastures. Rainfall was insufficient for pastures over large areas of the interior valleys and in the Northwest, and also in the western grazing sections. Hay production was reduced. In the Southern States, on the other hand, moisture and temperature conditions continued favorable.

#### Principal Crops

The United States this year produced large crops of cotton, tobacco, and winter wheat, and short crops of hay, spring wheat, and flaxseed. There were no pronounced deficits or surpluses of the other staple crops. Apples and peaches were produced in abundance. Crops with large acreages in the West suffered greatly. Ample winter and early spring rains, followed by a dry growing season, were ideal for winter wheat, cotton, and tobacco. In the area that was drought stricken in 1930, only Montana, Wyoming, and western North Dakota suffered again this year. The Ohio-Mississippi River area had abundant rain.

#### Acreage

Abandonment of fall and winter sown crops was small, and the spring was favorable for planting and seeding. On July 1 the area available for harvesting totaled 360,784,000 acres, 0.2 per cent less than the harvested acreage of 1930. Hundreds of thousands of acres were subsequently abandoned in the drought areas of the Western States. Abandonment of cotton acreage, however, was much below the average. In consequence, the total acreage of crops harvested was only slightly less than in 1930. Corn planting increased 4.1 per cent; oats, 2.8 per cent; tame hay, 0.9 per cent; potatoes, 10.7 per cent; and sweetpotatoes, 20.6 per cent. Cotton planting decreased 10 per cent; barley, 1 per cent; flax, 15.2 per cent; tobacco, 1 per cent; and wheat, 4.7 per cent. The shift from cotton and wheat to feed crops was logical in view of the prevailing low prices for wheat and cotton and the short production of feed crops in 1930. Expansion in the acreages of vegetable crops for shipment and for canning was checked. Truck crops for table decreased 1 per cent and those for canning 18 per cent.

## Cereal and Other Food Crops

A very large crop of 775,000,000 bushels of winter wheat overshadowed a near-failure crop of only 109,000,000 bushels of spring wheat, so that the total wheat crop (884,000,000 bushels) was 7.5 per cent above the average of 1925–1929. The winter-wheat crop was 42 per cent greater than the average, while the spring-wheat crop was only 40 per cent of the average. Of the spring wheats, the durum-wheat production of 20,000,000 bushels was less than one-third of an average crop. Spring bread wheats were less than 43 per cent of the average production. Rye, while grown principally in the 1930 drought area, was harvested early and produced 36,200,000 bushels, as compared with an average production of 46,100,000 bushels.

as compared with an average production of 46,100,000 bushels.

Rice production was 41,700,000 bushels—800,000 bushels greater than the 1925–1929 average. The buckwheat crop of 10,600,000 bushels was much above the last year's short crop of 7,900,000 bushels, but 21 per cent below the 5-year average. A crop of 20,000,000 bushels of dry beans was less than last year's large crop but still above the 18,400,000-bushel average. Cowpeas, an important food crop in the Southern States, were in abundant supply. Peanut production was 929,000,000 pounds, as against an average of 796,000,000 pounds. Sorghum for sirup yielded 24,400,000 gallons, nearly double the 1930 production and 85 per cent of the average. Sugarcane acreage was increased, but the yield per acre was low, and the production of 19,100,000 gallons of sirup was 10 per cent less than average. The sugar-beet crop was about average.

#### Cotton

The cotton crop was estimated on October 1 at 16,284,000 bales. At this figure it is the second largest ever produced. The largest was grown in 1926, when 17,977,000 bales were ginned. There was a production of 16,135,000 bales in 1914. This year's crop is 6.7 per cent above the 1925–1929 average of 15,268,000 bales. Acreage planted to cotton was 10 per cent less than in 1930, but abandonment was light, and the acreage left for harvest was 40,889,000—greater than the acreage harvested in any year prior to 1924, but 9 per cent below the 5-year average. Almost ideal weather conditions in all parts of the South, and below-average weevil infestation, more than offset the reductions in fertilizer applications. The yield per acre was 190.5 pounds, the greatest since the record yield of 209.2 pounds per acre in 1914. Yields per acre were well above average in every cotton producing State.

#### The Feed Crops

The combined production of the major feed grain crops—corn, oats, barley, and grain sorghums—was 103,000,000 tons. This was a production 14 per cent greater than in 1930, but 5 per cent below the

annual average in the 5-year period 1925-1929.

The corn crop was estimated at 2,703,000,000, bushels, which is practically equal to the 5-year average production. The crop was short from Michigan, Iowa, Nebraska, Kansas, and Oklahoma west to the Pacific, the shortage varying from 3 per cent in Oklahoma to 70 per cent in South Dakota. In the remainder of the country it was

generally above the average.

Oat production was 1,174,000,000 bushels, 14 per cent less than in 1930 and 11 per cent below the 5-year average. Dry, hot weather at ripening in July accounted for the reduced yield. Exceptionally low yields were recorded in the Dakotas, Montana, and Wyoming, with low yields in a group of neighboring States from Wisconsin to Nebraska and west. On the other hand, heavy yields were harvested from Missouri and Kansas south to the Gulf.

A large proportion of the country's barley crop is grown in the States that suffered from drought. The yield per acre was only 16.9 bushels, as compared with 5-year average yields of 25.9 bushels. Only 216,000,000 bushels (82 per cent of the 1925-1929 average production) was produced on an acreage 25 per cent above the 5-year average.

Grain-sorghum production in the Southwestern States was estimated at 129,100,000 bushels, half again as large as in 1930 and 3 per cent

above the 5-year average.

The hay crop was short. Production was \$8,400,000 tons, as compared with \$9,600,000 tons in 1930 and a 5-year average production of 107,500,000 tons. The wild-hay crop was cut to two-thirds of the average, and the alfalfa crop was much below the average. There was extensive killing of the new seedings of clover and other grasses in the 1930 drought area. The effect on the 1931 crop was counteracted as to quantity by the use of emergency hay crops. The coarse nature of some of these emergency hays and a heavy admixture of weeds in clover and timothy meadows, lowered the quality of the crop materially.

The supply of feed grains is supplemented by cottonseed and linseed meal and wheat by-products, and in exceptional years, like 1930, by the feeding of wheat. This year production of cottonseed meal will be large. Of linseed meal, however, the production will be small. The supply of bran and middlings should be well up to the average. Products supplemental to the hay crop will be in smaller supply. Corn, grain sorghums, and sorgo (sweet sorghum) forage will be somewhat more plentiful. The carry-over of old hay, which was large a year ago, was very small this year, and grain pastures are neither so plentiful nor so productive as they were last year.

#### Tobacco and Flax

A new record in tobacco production appears to have been set. The crop was estimated in October at 1,661,000,000 pounds. This is slightly larger than the 1930 crop, the largest previously, and 22 per cent above the average production during the previous five years. The season was favorable, and a slight decrease from the 1930 acreage was more than offset by increased yields. Burley-tobacco production (468,000,000 pounds) was more than 70 per cent above the 5-year average. The production of flue-cured tobacco, at 694,000,000 pounds, was much below the production last year, but slightly above the 5-year average. Fire-cured tobacco, 207,000,000 pounds, was 26 per cent above the average. Final yield and production figures will depend upon shrinkage in curing. The curing season in 1931 was generally favorable.

The flax crop was grown in the 1931 drought area. It totaled only 11,500,000 bushels—barely half a crop. Average production is 20,900,000 bushels. The quantity, including imported seed, used in crushing in the United States has averaged about 39,000,000 bushels in recent years. The yield on planted acreage in North Dakota was only 2.7

bushels, and for the United States only 3.7 bushels.

#### Fruits and Vegetables

Fruit production was ample. Of the five principal fruits, apples and peaches were each more than one-fourth above the 5-year average; pears were one-tenth above it; orange production was about the average; and only grapes were below the average. The production of these five fruits combined was about 10 per cent greater than the 5-year average and about 17 per cent above the production in 1930. The apple crop was reported at 223,000,000 bushels, with a commercial crop of 37,600,000 barrels. In the two principal apple-producing States, Washington and New York, the crops were about equal to the average of recent years. In the central area from Pennsylvania, Maryland, Virginia, and North Carolina west to Michigan, Illinois, Missouri, and Arkansas, the crop was from 50 to 150 per cent above the average. The production of peaches was about 78,000,000 bushels, a new record. Home canning was stimulated by low prices, but large quantities of peaches were allowed to go to waste for lack of a market.

The pear crop of 24,000,000 bushels was 13 per cent less than the record 1930 crop, though 9 per cent above the 5-year average. Just as in the case of apples, it was the central group of fruit States, rather than New York and the Pacific Coast States, in which production was

held above the average.

The grape crop in California was greatly reduced by drought, heat, and insect damage. It was only 1,300,000 tons, as compared with an average production of 2,200,000 tons. New York, Pennsylvania, Ohio, and Michigan—the leading grape States of the East—had crops ranging from 8 to 50 per cent above the average. Total grape production was about three-fourths of the 5-year average.

The crop of prunes in the Pacific Coast States was much below the 1930 crop, but just about equal to the 5-year average consumption of both fresh and dried prunes. The crops of oranges and grapefruit in Florida are estimated at about one-fifth less than the large crop of 1930. California citrus production will probably be about the average.

A large crop of cranberries was harvested.

The production of potatoes amounted to 375,000,000 bushels, about 9 per cent greater than in 1930, but about 2 per cent less than the average crop. The yield per acre was 106.9 bushels—3.3 per cent below the 10-year average. The area planted was 3,506,000 acres, or 4 per cent greater than the average acreage from 1925 to 1929.

The crop of commercial early potatoes was about 46,000,000 bushels, greater by 3,000,000 bushels than in 1930 and 7,000,000 bushels above the 5-year average. In 19 surplus late-potato States, the production of 255,000,000 bushels was 9 per cent greater than in 1930; in 16 deficit

States, production was 3 per cent more than last year.

The sweetpotato crop was hurt by dry weather in September, but the acreage was much greater than in 1930, and the production was 77,000,000 bushels, or 15,000,000 bushels greater than in 1930 and only 3,000,000 bushels less than the 5-year average. The production of cabbage, onions, and tomatoes for canning was considerably below that of 1930.

#### WHEAT SITUATION

This has been a disastrous year for wheat growers, but the first seeds of the trouble were planted many years ago. They were wheat seeds and led to world-wide overproduction. When the war deprived Russia of its customary wheat market in western Europe and also curtailed all European wheat production, the wheat industry was enormously stimulated in the United States, Canada, Argentina, and Australia. As already noted our own wheat area decreased after the war but rose again to 61,464,000 acres in 1929, and was only about 6 per cent below that figure this year. In Canada, Argentina, and Australia, after a spurt during the war period and a temporary decline afterwards, wheat acreage climbed similarly. The aggregate increase for these three countries between 1924 and 1929 was no less than 10,000,000 acres. Russia began expanding its wheat acreage in 1923 and reentered the world's wheat market in 1930 with a wheat production equal to or greater than its pre-war production. The wheat area in Russia harvested in 1931 was officially reported to be 92,400,000 acres, an increase of 8,600,000 acres over the 1930 wheat acreage. Including the estimated production of Russia but not that of China, the world's wheat output in 1930 was nearly 4,900,000,000 bushels, as compared with a pre-war record of about 4,100,000,000 bushels in 1913.

Seldom has a more extreme example of overproduction existed in modern agriculture. It is a cumulative, and not merely a seasonal, condition. This is shown by the mounting world carry-overs, which demonstrate that more wheat is produced annually than is consumed

annually. On July 1, 1931, the world carry-over of wheat was estimated at 679,000,000 bushels, as compared with 578,000,000 bushels on July 1, 1930. These figures include, for the United States, an item not formerly included, namely, an estimate of wheat stored by mills for other interests. Leaving out this item, and estimating the carry-over on the old basis, the world's carry-over on July 1, 1931, was 659,000,000 bushels, as against 569,000,000 bushels on July 1, 1930.

World production of wheat this year will be less than last year's, but the difference will not make a large cut in the carry-over into next year. As now estimated, world wheat production for 1931 is reckoned at from 200,000,000 to 300,000,000 bushels less than the output in 1930. This country's crop shows an increase (884,280,000 bushels, estimated on October 1, as against 863,430,000 bushels harvested in 1930); but the production is lower in Canada, Russia, Argentina, Australia, and parts of Europe. The Northern Hemisphere (outside Russia and China) has an indicated output of 3,250,000,000 bushels, as against a harvested production of 3,314,000,000 bushels in the same area last year. Relative to the reduced demand by importing countries, the world's wheat surpluses this year have thus far been more burdensome than they were last year.

#### World Consumption of Wheat

Many farm commodities are low in price just now because demand has fallen. The demand for wheat has fallen too, because importing countries lack the purchasing power to maintain their imports at the usual level. But wheat consumption has not declined as much as the consumption of some other farm commodities. In hard times poor people eat relatively more cereals, and cut down on other things. World consumption of wheat has grown steadily in the last 10 years. In the 1930–31 season, total apparent disappearance of wheat outside Russia and China (for China consumption statistics are not available) was 3,800,000,000 bushels, as compared with only 3,200,000,000 bushels in 1921–22, and also in 1922–23. The consumption in 1930–31, a depression year, was well above that of the preceding year, and about equal to that of the highly prosperous season 1928–29.

The main trouble with wheat has not been a declining consumption but a too rapidly mounting production. This conclusion is not set aside by the fact that the world's wheat output this year will be somewhat less than it was in 1930-31. It is the trend that counts. Wheat growers are suffering from the maladjustments of two decades. The burden falls heaviest on the wheat-exporting countries. Wheat-deficit countries can protect their wheat growers by tariffs, embargoes, and

milling restrictions.

In the years of industrial expansion and thriving trade that preceded 1930, the weakness of the world's wheat industry was masked. Prices were high enough to keep poor land in production, and to make good land profitable. In the seven years ended July 1, 1930, No. 2 hard wheat at Kansas City averaged \$1.28 a bushel. Despite warnings, farmers thought they were safe in expanding their production. They attached insufficient importance to world-wide increases in wheat acreage and in wheat carry-overs, and to the import-restriction policies that betokened distress in wheat-deficit countries. Economic depression brought the underlying trouble to a head. The combina-

tion of world overproduction and business depression resulted in extremely low prices. For the United States as a whole, the farm price of wheat as of October 15, 1931, was only 36.1 cents a bushel, as compared with 65.6 cents on October 15, 1930. There was some recovery in October and early in November. In the pre-war period 1910–1914, the average farm price of wheat was 88.4 cents. Farm expenses of production and living costs are much higher than they were before the war. Debt and taxes are much greater. Hence prevailing wheat prices are literally ruinous.

#### United States Farmers Aided by Farm Board

Our own wheat farmers suffered less than those of the other principal wheat-exporting countries in the wheat-price slump, because from the middle of November, 1930, to the middle of June, 1931, the Federal Farm Board maintained prices in the United States at a level well above the world market. No Government agency, however, can support wheat prices indefinitely against pressure of the sort that has come against them in the last two years. Surplus production and lack of purchasing power in the principal importing countries make an insuperable obstacle. Therefore it is encouraging to note that various countries are beginning to reduce their wheat acreage. The wheat acreage was reduced this year in the United States, Canada, Argentina, and Australia. Though the reductions were brought about partly by adverse weather conditions at seeding time, the price situation was not without influence. Russia shows no disposition to join the movement. Wheat growing in Russia, moreover, is carried on in such a way that plantings do not respond to world prices as do plantings in other countries. This is a factor with which wheat growers in all other countries must deal. It means that their readjustment problem will be more difficult than it would be if Russia could be counted on to behave as other countries do when markets fall But no country can continue to produce for export indefinitely at a loss. Russia, too, must eventually count all its costs of production. It is not probable they are less than those of the more favorably situated wheatproducing areas elsewhere. In the United States it seems desirable further to reduce the acreage in wheat in all areas where costs of production are relatively high. When surplus stocks have been absorbed and excess acreage withdrawn from production, and when various elements in production costs and handling costs have been adjusted to the prevailing lower price level, our wheat industry should again be prosperous though reduced in size.

#### COTTON SITUATION

Cotton prices fell at the beginning of the 1931-32 season to the lowest point touched since 1898, with no proportionate decline in the farmers' costs of production. As a result, the situation of the cotton growers became as serious as it had ever been in the history of the country. The difficulty sprang from circumstances long in preparation, as well as from the prevailing world depression. About 10,000,000 acres were added to the cotton area of the United States after the war, and methods were developed for combating the boll weevil. The increased acreage, combined with increased yields per acre, enabled the United States to produce large cotton crops under average

conditions. In exceptionally favorable seasons, it produced cotton

excessively.

Meantime foreign countries, responding to the stimulus of the previous cotton shortage, expanded their production. India, Egypt, and Russia enlarged their output greatly, and other countries began growing cotton. Foreign cotton spinners encouraged these developments, which coincided for some years with large world consumption. Hence the cotton market did not feel any depressing effect immediately. But the inevitable reaction was merely postponed. Despite an increased industrial demand for cotton in the United States, more than half the American crop had to be sold abroad. It came into competition with cheaper foreign cottons, which foreign spinners purchased in an increased proportion to their total requirements. When importing countries reduced their takings on account of disturbances in the market for cotton goods, it became apparent that cotton growing was over-expanded. Great Britain, the largest foreign consumer of American cotton, lost trade in cotton manufactures owing to the development of cotton-textile manufacturing in other countries, and also as a result of the Indian boycott on foreign goods. Some of the countries that expanded their cotton-textile manufacturing specialized in the cheaper foreign cottons, to the obvious injury of our cotton export trade.

#### Downturn Preceded Depression

These influences had noticeable effects nearly a year before the present world depression started. Cotton exports from the United States fell off in the latter part of the 1928-29 cotton marketing season. Germany's textile industry, which had been fairly active, became almost as depressed as Great Britain's, and textile manufacturers in other countries of central Europe found the going hard. It is thus evident that the slump in the world's trade in 1929 did not cause, but merely accentuated a disparity between the production and the consumption of cotton. World consumption of cotton at the rate attained in the postwar period of industrial activity could not last, because it was not backed up by sufficient buying power in the cotton-importing countries. Europe in particular could not export enough goods to pay for its imports, and the balance had to be struck in credit. When this could no longer be satisfactorily done, cotton consumption had to decline. Economic difficulties elsewhere made matters worse. China's demand for cotton was restricted by the fall in the purchasing power of silver. Russia, which for some years had imported American cotton, is using home-grown cotton almost altogether and during the past season had some left for export. Cotton consumption dropped everywhere as the depression gathered force. and cotton stocks accumulated.

Prices naturally declined. In order to check the movement the Federal Farm Board formed a Cotton Stabilization Corporation, which bought and stored about 1,300,000 bales of cotton. The Farm Board also loaned money on cotton to cotton cooperative associations. Nevertheless Middling %-inch cotton at the close of the 1930-31 season sold, at 10 principal markets, at an average price of less than 8 cents per pound. For the entire 1930-31 season the price at these markets averaged 9.61 cents per pound, as compared with 15.79 cents in the

1929–30 season and 19.72 cents in the 1927–28 season. Though the consumption of cotton in the United States increased as the 1930–31 season progressed, total domestic consumption for the season was only 5,271,000 bales, as against 6,106,000 bales in 1929–30 and 7,091,000 bales in 1928–29. Exports of cotton in the United States in the 1930–31 season were only 6,760,000 bales, as compared with 8,044,000 bales in the 1928–29 season. Foreign cotton consumption did not improve in the early months of the present season, which began with a world carry-over of American cotton that was the second largest on record. The supply for the 1931–32 season is well above the previous record supply of 1926–27 and more than twice as large as the world's consumption of American cotton in 1930–31.

#### Farmers Were Forewarned

This disastrous situation did not fall upon the farmers without warning. In the fall of 1930 the Department of Agriculture issued a special outlook report for the Southern States in which developments affecting the cotton situation were considered in detail. The report drew attention to "certain long-time developments which may necessitate adjustments in production over a period of years." It urged the advisability of considering the problem before adjustments were forced upon the country. This recommendation, with various facts about cotton conditions at home and abroad, was carried to farmers through Federal, State, and private agencies. Acreage planted to cotton in 1931 was reduced, as were production costs. Though the acreage reduction did not suffice to strengthen the cotton market, or the reduced expenditures to make the crop profitable, it indicated a definite

response to "outlook" information.

In adjusting the production of cotton to market requirements, there is no question of withdrawing from the foreign market. American growers can compete with foreign producers, and cotton is generally more profitable or less unprofitable than other crops that can be grown in the South. During the first rapid spread of the boll weevil, this country's power to retain its position in the world's cotton trade was questioned. It has since demonstrated its ability to hold its place in spite of the boll weevil, and in the face of increasing foreign competi-The immediate need is not further evidence that cotton can be grown abundantly in the United States, but more attention to means of reducing production costs and improving the quality of the crop, while at the same time its volume is adjusted more nearly in harmony with the world's demand. Land that can not grow cotton profitably under average conditions should be eliminated from cotton growing. Efforts should be continued to improve the staple and the spinning qualities of cotton. The department is conducting research on these and allied problems. Further study should be given to the problem of making premiums for superior cotton available to growers at country markets. Substantial progress in this direction has been made in recent years, through the work of public agencies and farmers' cooperative associations.

#### LIVESTOCK SITUATION

Livestock producers at the beginning of 1931, like the producers of other agricultural commodities, were faced with the problem of marketing their products under adverse conditions. With domestic and foreign demand greatly reduced, sharp price recessions were necessary

to move the market supply of meat.

Supplies of livestock, other than sheep and lambs, marketed during the year were not excessive for normal conditions, but as a result of the reduced consumer demand, returns to producers for all classes of livestock were much smaller than those of 1930 and were probably the smallest for any year since 1911. The total live weight of livestock slaughtered under Federal inspection during the first half of the year, amounting to 10,333,000,000 pounds, was only about 2 per cent larger than the relatively small volume slaughtered during the corresponding period in 1930, but the total amount paid by slaughterers for such stock was 28 per cent less.

In other words, total expenditures by slaughterers for these animals dropped from \$1,006,000,000 during the first half of 1930 to \$723,000,000 during the first half of 1931. Of this reduction of \$283,000,000, about \$150,000,000 was on hogs, \$112,000,000 on cattle, \$12,000,000 on sheep and lambs, and \$9,000,000 on calves. Farm prices of livestock in August averaged 23 per cent lower than those of a year earlier, whereas grain prices were down about 47 per cent, cotton prices 44 per cent, prices of fruits and vegetables 35 per cent, and those of dairy

products 26 per cent.

Cattle numbers on farms have had an upward trend since 1928 but 1931 was the first year since 1926 in which cattle and calf slaughter was larger than in the previous year. During the first half of 1931, 2.8 per cent more beef and 7.4 per cent more veal were produced under Federal inspection than in the corresponding period in 1930; steer slaughter, amounting to 2,151,000 head, increased by 155,000 head, or 8 per cent. Low prices caused the holding back of many cows that would normally have been marketed, and cow and heifer slaughter, totaling 1,625,000 head, fell off 100,000 head or 6 per cent. The ratio of steer slaughter to total slaughter was relatively higher in June than in any previous month of the year, indicating that reduction in dairy herds by slaughter was still relatively light. Midsummer reports from dairy men indicated that the supply of such cows going to market during the last half of 1931 would be considerably larger.

#### Declines in Livestock Prices

From the first week in January to the last week in May the decline in the weekly average price of different grades of steers at Chicago amounted to \$5.50 per hundred pounds on choice, \$4 on good, \$2.40 on medium, and \$1.60 on common. An unusually high percentage of the better grades in the supply tended to accentuate the decline on these grades. The average price of slaughter cattle during the first six months of 1931 was \$6.61, as compared with \$9.74 and \$11.04, respectively, during the corresponding periods of 1930 and 1929. The average price of calves was \$7.88 during the first half of 1931, while it was \$10.85 and \$13.17 in the corresponding periods of 1930 and 1929. Prices of the better grades of steers and heifers advanced materially

between the first of June and the end of August, but prices for the lower grades of cattle were only slightly higher at the end of this period than at the beginning. The decline in stocker and feeder prices in June, when stocker and feeder shipments into the Corn Belt were the smallest for the month in at least 13 years, reflected a widespread lack

of confidence in future cattle prices, poor pastures in the Middle West, and poor range and feed prospects in some Western States. As a result, the estimated number of cattle on feed in the Corn Belt on August 1 was 13 per cent smaller than on that date in 1930. With two years of unprofitable cattle feeding to look back upon, Corn-Belt feeders reported a considerable decrease in the number of cattle they expected to purchase in the fall of 1931 despite the prospects of a large supply of cheap feed. It is probable, however, that the August advance in the prices of the better grades of fed cattle will result in a stronger feeder demand late in the season than was indicated by the August 1 report.

Nevertheless, the relative economic position of the cattle industry as compared with that of most of the alternative agricultural enterprises remained as favorable as when prices were on a much higher level. The farm price of beef cattle in July was 66 per cent of the 1925–1929 5-year July average. Corn, butter, and hog prices were 58 per cent, lamb prices 38 per cent, and wheat prices 35 per cent of their respective July averages for that period. In 1930 the per capita supply of beef and veal from total slaughter was the smallest in the 31 years for which records are available. The per capita supply for 1931 will not

be materially larger.

#### Hogs Bring Lower Returns

The number of hogs on farms has declined in recent years. The total of 52,323,000 on January 1, 1931, was about 8,300,000 less than on that date in 1928. Federally inspected slaughter was reduced from 49,795,000 head in 1928 to 44,266,000 head in 1930. Slaughter in the calendar year 1931 may not differ greatly from that in 1930, but the number slaughtered during the crop year ended September 30, 1931, showed a reduction of about 5 per cent. A reduction of 1 per cent in the number of hogs slaughtered under Federal inspection during the first half of 1931 was more than counterbalanced by an increase in the average weight. The total dressed weight of 4,100,000,000 pounds was 1.2 per cent larger than the relatively small production during the corresponding period in the year previous. The average price paid by slaughterers for these hogs was \$7.05 a hundred pounds, as compared with \$9.90 paid in the first half of 1930. This is a reduction of 29 per cent.

Hog prices declined steadily from October, 1930, to February, 1931. After a temporary seasonal rise in March, the decline was resumed in April and was not checked until early June, when new postwar lows were established despite the fact that slaughter supplies were the smallest for May in five years. There was a reduction of 1,273,000 head in Federal-inspected slaughter during May, June, and July. Yet the summer seasonal rise in hog prices was relatively small, and was completed by August 1. Prices declined sharply through that month and at the beginning of September were at the lowest level since 1908. Nevertheless the relationship of feed prices to hog prices continued favorable for hog feeding, and the 1931 spring pig crop was increased 2.5 per cent. A large increase in the fall crop was indicated.

Foreign demand for hog products was relatively weak. Hog producers in central Europe and Denmark have greatly expanded their pro-

duction in recent years. Although total exports of hog products in 1930 were smaller than in any previous year in the present century, a further reduction occurred in 1931. Exports of lard in the first half of the year were 18 per cent smaller and those of pork 47 per cent smaller than in the first half of 1930.

## Record Slaughterings of Sheep

Sheep on farms in the United States have increased in number every year for the last nine years. At the beginning of 1931 the country had the largest number of sheep and lambs on record. There were approximately 16,000,000 head more on January 1, 1931, than on January 1, 1922, the low point in the present production cycle. This was an increase of 44 per cent. During the last seven years the estimated annual lamb crop of the United States has increased about 1,500,000 head each year. The total of 31,684,000 head, estimated in 1931, was almost 10,000,000 head larger than the crop of 1925. Inspected slaughter increased about 53 per cent between 1922 and 1930, or from 10,929,000 head in the former year to 16,696,000 head in the latter. Because of population growth, however, the per capita supply of lamb and mutton increased only from 5 pounds to 6.6 pounds, or only 32 per cent. New high monthly record slaughterings under Federal inspection have been made in every month but two (November, 1930, and March, 1931) since January, 1930. Per capita consumption during 1931, however, will probably be somewhat smaller than the record of 8.1 pounds in 1912.

Despite increasing market supplies each year, sheep and lamb prices remained relatively high from 1922 to 1928 inclusive. In April, 1929, however, a sharp downward trend began, which was not checked until October, 1930. Prices were fairly stable during the last three months of 1930, and advanced moderately during the first three months of 1931. The trend has been downward since April. Farm prices of lambs in July were lower than in any other July since 1911. Farm prices of sheep in July were the lowest for any month since records of farm prices were started in 1910. Market prices for aged ewes were so low that returns would sometimes barely cover marketing costs. Large numbers of such ewes were held back, and lambs made up an unusually

#### Wool

large proportion of the slaughter supply.

The wool clip of the United States increased in 1931 to 368,000,000 pounds, or 7 per cent more than in 1930. Preliminary estimates indicate that the world clip for the year will be almost as large as the record clip of 3,210,000,000 pounds shorn in 1928. World stocks of wool are large. Wool consumption by woolen mills in the United States during the first half of 1931 was considerably larger than in the first half of 1930, but no significant increases in consumption have yet been reported by mills in European countries. A downward trend in wool prices started in 1928. It continued with few interruptions into 1931. Recently increased activity in the wool-textile industry of the United States has brought a strengthening of domestic wool prices.

#### DAIRY SITUATION

The sharp declines in prices of dairy products which began late in 1929 continued well into 1931, and incomes from dairying were drastically cut. This situation obliged dairymen to consider their production programs carefully and to undertake desirable readjustments. From its nature, however, the dairy industry can be readjusted to changing market conditions only very slowly, and production is still high. For quick relief dairymen are doing what they can to reduce their costs and to develop supplementary sources of income. Meantime they are instituting long-time production adjustments by culling out low-producing animals, and by decreasing the proportion of heifers in their herds. Though this procedure may not have noticeable effects on dairy prices for some time, it is permanently constructive and will unquestionably have important beneficial results eventually.

The number of dairy cows in the United States has increased gradually since 1900. There were 2.4 per cent more milk cows on farms on January 1, 1931, than a year earlier. Moreover, the number of yearling heifers exceeded the number required for normal replacement. Nevertheless the prevailing low prices for dairy products may bring about substantial readjustments. As already noted, dairymen show a disposition to raise fewer dairy heifers. The ratio in 1931 of heifers 1 year and 2 years old to the number of dairy cows decreased. This decrease was a reflection to some extent of the unsatisfactory price situation. The number of dairy cows on farms will probably not increase as greatly in the near future as it has done in the recent past.

#### Other Readjustment Possibilities

Other readjustment possibilities exist. Dairy production depends materially on the relation between feed prices and the prices of dairy products. Just now feed prices are low as well as the prices of dairy products. Hence, the relationship is still not unfavorable to dairy production. Improvement in grain prices, however, would soon make it less favorable. Another possibility of change lies in the fact that dairying is very closely associated with beef-cattle production in certain parts of the country. Indeed a large part of our total dairy output comes from areas that draw no sharp line between dairy cattle and beef cattle. When the beef-cattle industry is depressed, dairy output in these areas increases. With improvement in the beef situation, a shift in the opposite direction takes place. Slaughter of dairy cows and heifers was relatively low in the first half of 1931. Recently it has increased. Reduction of dairy herds by slaughter should strengthen the dairy industry materially. As other branches of agriculture come into a better relationship to their markets, pressure upon dairying will be relieved. Such pressure is heavy in periods of depression because dairying more than any other farm enterprise is resorted to as a source of cash income to meet current expenses.

Until the onset of the depression in 1929, the demand for dairy products in the United States had risen quite steadily for a number of years. Since then it has fallen off. Consumption of fluid milk has dropped, and consumption of manufactured dairy products has not increased appreciably despite heavy price declines. The dairy surplus has gone mostly into butter, and the butter markets have carried much

of the burden. Butter production in 1930 was not excessive because of the drought. In fact it barely equaled the production of 1929. In the early part of 1931 butter production was unusually heavy. It declined somewhat during the summer months, during which period drought again prevailed in some important butter-producing areas. Total production of all manufactured dairy products this year has been somewhat less than it was in 1930. Hence, the underlying supply and

demand situation suggests improvement.

Reserve stocks of dairy products have been reduced greatly. Coldstorage supplies of butter and American cheese on September 1 were the lowest for that date since 1923, and stocks of condensed and evaporated milk held by manufacturers were the lowest for that date in the last three years. This decline in current supplies tends obviously to support the dairy markets, but in the conditions now prevailing it is not doing so to the degree that it would in better years. One cause is an extremely conservative buying policy among the distributors of dairy products, who do not know how consumption might be affected by price advances. Improved business conditions would undoubtedly cause an increase in the consumer demand for dairy products; but in the present condition of the dairy industry such an increase could easily be offset by an increase in dairy production. Improvement depends largely on the restoration of better demand conditions. Production power is so elastic, however, that much depends on action taken by the dairy industry. With the number of dairy cows increasing, it is comparatively easy to expand dairy production. Restraint is necessary if the dairy industry is to improve when business and agriculture generally improve.

#### POULTRY SITUATION

Poultry men faced unusually perplexing problems. Poultry production gave relatively better returns than egg production. Excessive stocks of eggs were stored in 1930, and egg prices remained low during the storage season. Storage operators lost heavily. In consequence, they followed this year a cautious policy which tended to keep egg prices down. Prices to producers for eggs during the first eight months of 1931 averaged below those for any similar period since 1910. Curtailed hatchery operations reduced the size of the new poultry crop by fully 8 per cent, and there was close culling in farm flocks. The number of laying hens in farm flocks was reduced below the number last year and below the 5-year average for the period 1925-1929. On the other hand, liberal feeding of grain and poultry feed caused relatively high egg production per hen. Total production of eggs during the summer and early fall was heavier than had been expected, and storage stocks of eggs increased. Total stocks of both shell and frozen eggs on September 1 exceeded the 5-year average. Meantime lessened consumer buying power tended to check consumption. As a result the usual fall seasonal rise in egg prices was below normal.

Prices to producers for chickens averaged lower this year than in any year since the war. Feed costs were low, however, and the returns to producers were generally more satisfactory than in other lines. As the year advanced the spread widened between the cost of poultry rations and the market prices of poultry and eggs. Close culling of flocks, smaller farm consumption of poultry, and liberal feeding furnished the markets with a steady supply of poultry, which was exceptionally well

finished. Consumption of poultry was remarkably well maintained, and storage stocks until early fall were relatively light. Poultry prices were profitable to storage operators during the first half of the year. Heavy marketing of poultry developed in July, however, and the market situation became less favorable.

#### FRUIT AND VEGETABLE SITUATION

Prices of fruits and vegetables this year, with few exceptions, declined to levels much below those prevailing in 1930. Late lettuce was an outstanding exception. Pears, owing to light production, resisted the downward trend fairly well. Potatoes and peaches were extremely cheap. Peach production was a record. Apple production was large, and apple prices correspondingly low. The August forecast indicated the heaviest crop since 1926. Output of cantaloupes and similar melons in eight late-producing States was about 6 per cent more than in the previous season. Grape production, on the other hand, was reduced by hot weather, and was estimated at 28 per cent below the production of 1930. In 10 late-shipping States the output was estimated at about 12 per cent below the production in 1930. Drought conditions in Florida ended in July, and the prospects for oranges and grapefruit in that State improved. In California, though high temperatures prevailed, the fruit was sufficiently advanced in September to prevent shedding or serious injury. Output of watermelons in 16 late States was estimated at 36 per cent more than in 1930. Potato production was substantially larger than in 1930, particularly in the Northeastern States. Sweetpotato production was estimated in August at about 30 per cent above the output of the previous year. Production of onions in 17 States was about 31 per cent less than in 1930. Tomato production in 14 late-producing States was nearly 20 per cent greater than in 1930. Excessive production in many lines and low prices brought about an unusual number of bankruptcies in the fruit and vegetable trade, and net returns to growers

Growers had the advantage of some decrease in fertilizer prices and in wages. On the other hand, diminished demand lowered prices for some of the less desirable sizes of fruits and vegetables to a point below harvesting and transportation costs. Shipments of No. 2 potatoes from the South Atlantic States were relatively small, and the prices received even for No. 1 potatoes were unprofitable to most growers. In the Imperial Valley of California cantaloupe production was enormous, and the quality of the crop was fully up to the average; yet cantaloupe prices were so low that the year was considered the most disastrous in the history of California's cantaloupe industry.

# Heavy Losses to Growers

It proved impossible, from the beginning of the season, to realize the costs of packing and marketing small-sized plums on the Pacific coast. The same was true of peaches in Georgia. In both these areas considerable quantities of fruit were not moved. Marketing outlets for canned goods were restricted. Canners and dealers began the season with unusually large carry-overs, particularly of peaches. Accordingly, California canners limited their pack for the current year. This involved heavy loss to the growers. Overproduction of yellow

cling peaches for canning had become chronic in California. Canners' and growers' organizations cooperated this year in a new method of adjusting production to demand whereby marginal orchards were destroyed under an arrangement involving payment at a relatively low rate per ton for fruit on the trees provided the trees were uprooted before the crop was ready for harvesting.

This outstanding example of economic readjustment to market conditions followed recommendations offered four years ago by Federal and State officials. The overplanting of cling peaches was emphasized by the so-called peach war of 1927, in the course of which the entire crop of Tuskenas (Tuscans) was permitted to go to waste while growers and canners argued over prices. When Federal and State officials recommended the systematic removal of enough acreage to bring production into line with the demand, with the operation financed by contributions from the entire industry, the proposal met with much criticism. To-day it is in process of accomplishment. It should enable growers to avoid the usual process of adjustment through bankruptcy and permit the preservation of the better orchards. Similar plans to solve the surplus problem of the grape industry have been under discussion. A remedy is needed urgently because the demand for juice grapes has decreased in the Eastern States and the production of table and raisin grapes has continued to increase. So serious have been the resulting difficulties of the grape industry that many owners have lost their vineyards.

#### EXPORTS AND IMPORTS

The value of our agricultural exports in the fiscal year ended June 30, 1931, amounted to only \$1,038,000,000. This was a reduction of \$457,867,000 from the total of the preceding fiscal year, and was the lowest for any year since 1911. In volume our agricultural exports have declined about 25 per cent in the last two years. Most of this decline took place in the 1928-29 season, but meat products suffered most in the 1930-31 season. Exports of fruit products were greatly reduced in the 1929-30 season, but recovered in the 1930-31 season. Exports of tobacco have been well maintained through the depression.

The percentage of agricultural production exported declined between 1928-29 and 1929-30 from 12.2 to 10.2 per cent, and probably declined more in 1930-31. In 1919-20 the United States exported about 17.4 per cent of its agricultural production. The depression in 1921 brought the proportion down to 13.5 per cent. There was some recovery; and in 1924-25 the ratio was 16.1 per cent. Since then the trend has been downward.

Cotton has suffered most from the reduction in foreign demand. Exports of cotton excluding linters declined from 8,520,000 bales in the 1928-29 season to 7,096,000 bales in the 1929-30, season and 7,048,000 in the 1930-31 season. The reduction in volume was accompanied by a much greater reduction in value. In the 1930-31 season the value of our cotton exports was only 56 per cent of their value in the 1928-29 season.

Exports of wheat, including flour in terms of wheat, declined from 163,687,000 bushels in the 1928-29 season to 153,245,000 bushels in 1929-30 and 131,536,000 bushels in 1930-31. The volume of our wheat exports in the 1930-31 season was 14 per cent less than in the

previous season, and the value 38 per cent less. A short corn crop in 1930, as well as unfavorable foreign conditions, resulted in a great

reduction also in the exports of feed grains.

Exports of meat and meat products have been greatly reduced. Exports of total meats decreased 35 per cent in the 1930-31 season, as compared with the previous season. The main decline was in pork products. Bacon and Cumberland sides fell off 61 per cent, from 132,-967,000 pounds in 1929-30 to 52,412,000 pounds in 1930-31; hams and shoulders dropped 23 per cent, from 130,318,000 to 99,749,000 pounds; fresh pork decreased from 18,768,000 to 11,093,000 pounds, or 41 per cent; pickled pork was reduced by 47 per cent, from 39,809,000 to 21,118,000 pounds. Fresh pork exports were the lowest since 1914-15; exports of pickled pork had not been so small since 1851. The lowest intervening year was 1869, when the amount was 24,000,000 pounds. Exports of bacon were the lowest since 1870, in which year they were 39,000,000 pounds. Export of hams and shoulders were the lowest since 1894, except in 1910-11, when they were 58,000,000 pounds.

Exports of leaf tobacco declined only slightly from 587,125,000 pounds in 1929-30 to 566,036,000 pounds in 1930-31. The decrease was general in all classes except Maryland and Ohio Export, which

increased 29 per cent.

## Increased Exports of Fresh and Dried Fruits

Considerable increases were recorded in the exports of fresh and dried fruits. Exports of dried apples were 38,121,000 pounds, as against 23,769,000 pounds in the fiscal year 1929-30. Export movement of dried prunes jumped to 296,254,000 pounds from 142,989,000 pounds the previous year. Exports of dried fruits for salads totaled 14,518,000 pounds, as against 1,332,000 pounds the previous year. Exports of fresh apples were 6,780,000 barrels, as compared with 3,426,000 barrels in 1929-30. Exports of fresh pears rose to 134,670,000 pounds, after a decline to 62,024,000 pounds in 1929-30. Exports of oranges and lemons were about the same as in the previous year; and there was an increase of 43 per cent in the quantity of grapefruit exported.

Exports of canned vegetables declined 33 per cent in both quantity and value. Exports of vegetable oils decreased in both quantity and value. Cottonseed-oil exports (crude and refined) fell from 31,998,000 to 26,353,000 pounds, with a decrease of 20 per cent invalue; linseed-oil exports dropped from 2,129,000 to 1,298,000 pounds, with a 51 per cent decrease in value; soybean-oil exports were 4,410,000 pounds in 1930-31,

as against 5,509,000 pounds in 1929-30.

Imports of agricultural products (excluding forest products and rubber) were reduced in volume and value. For the season July 1, 1930, to June 30, 1931, they amounted to \$1,067,000,000, a decrease of 37 per cent from the total of the preceding year. The value was the lowest since 1914–15. Imports of animal products were greatly reduced in both volume and value. The value of imported dairy products was reduced 47 per cent; of imported eggs, 67 per cent; of imported hides and skins, 53 per cent; of imported meat and meat products, 71 per cent; of imported silk, 37 per cent; and of imported wool, 59 per cent.

The quantity of coffee imported increased, but the value decreased. Imports of sugar and tea declined slightly in value. A great reduction

in the value of sugar had taken place before the present depression began. Imports of vegetable oil and oilseed products decreased in value. The volume of the imports of unmanufactured tobacco increased, but a decline in prices reduced the value 21 per cent from 1929-30.

#### SIGNIFICANT POPULATION CHANGES

Farm population in the United States showed a net increase in 1930 for the first time since 1922, when the department began making annual estimates of the number of people living on farms. From other data it appears that the indicated increase in our farm population last year was the first annual increase in two decades. For January 1, 1931, the estimate of farm population was 27,430,000, as against 27,222,000 on January 1, 1930. During 1930, it is estimated, 1,543,000 persons left the farms, as compared with 1,876,000 the previous year. On the other hand, 1,392,000 persons went from cities to farms in 1930, as against 1,257,000 in 1929. Hence the net movement from farms to cities was only 151,000 in 1930, as compared with from 576,000 to 1,120,000 in the other years since 1921. On farms, however, there is a considerable surplus of births over deaths. The surplus in 1930, it is estimated, was 359,000 persons. Balancing the gains and losses for the year, leaves a net gain in farm population of 208,000 persons.

Unemployment has greatly reduced the flow from farms to cities and has stimulated somewhat the movement of city people in search of the cheaper conditions of livelihood to be found in the country. It is, of course, impossible to say on the basis of the figures for a single year whether or not the tide has turned. Urban unemployment tends to increase the farmward movement, which diminishes again with the revival of industrial activity in cities. Undoubtedly the present trend is fraught with important agricultural consequences. It will increase the difficulty of adjusting farm production to market requirements and will weaken the urban market for agricultural goods. On the other hand it has a good side, for subsistence is more easily got in the

country than in the town in periods of trade depression.

Of far greater significance in the long run for American agriculture is the tendency toward a marked decrease in the birth rate in this country and other important industrial countries. In the United States the effect of a declining birth rate is accentuated by restrictions on immigration both directly and through the indirect effects on birth rates and death rates. In the period, 1920-1930, the census reported an increase of about 17,000,000 in our population, or 16 per cent. But the gain was greatest in the early years of the decade. Up to 1923 it was nearly 2,000,000 yearly, after which a steady decline set in. At present the gain is only about 1,000,000 a year. The decrease is attributable partly to a net decline in immigration, partly to a decrease in births, and partly to an increase in deaths. The increase in deaths is due mainly to an increase in the number of elderly people in the population, rather than to a tendency for death to occur at earlier ages. It is estimated that the number of deaths annually will continue to increase because fewer children are being born and fewer immigrants, who are mostly young people, are arriving.

## Stationary Population Foreshadowed

From these and other facts, statistical authorities conclude that a stationary population for the United States is only about 30 years distant. Assuming no changes in restrictions on immigration, an increase of about 10,000,000 is expected from 1930 to 1940, of about 7,000,000 from 1940 to 1950, and of only about 4,000,000 from 1950 to 1960. If these estimates prove correct, the population in 1960 will be only about 144 000,000 or about 20,000,000 more than at present.

Significant tendencies exist in urban and rural birth rates Only four or five of the cities with a population of 100,000 or above have enough children to maintain permanently a stationary population without accessions from the outside. Most cities have only about three-fourths of the number of children necessary to do so. With immigration practically stopped, our cities both small and large depend for their increase mainly on the natural rate of increase of the rural population. Birth rates are declining on the farms as well as in the cities, though not so rapidly. It therefore seems probable that preventing the Nation's population from actually declining may be found to depend on the development of policies that will admit of a large proportion of the population dwelling in a rural environment, even though partly or wholly dependent on nonagricultural employment.

#### PUTTING LAND TO THE RIGHT USES

Large surpluses of the major farm products point to the probability that for some years little or no expansion of our farming area will be required. For the more remote future the expected drop in the rate of population increase lessens materially the prospective need for additional farm land. The reduced need for new crop and pasture lands and for farm population is emphasized by Europe's striving toward agricultural self-sufficiency. It is also emphasized by increasing foreign competition in the world's agricultural markets. Recent technical progress permits the use of semiarid areas hitherto unsuited for crop production. Increased efficiency economizes both land and labor. Changes in domestic consumption, moreover, are not such as

to require a larger crop and pasture acreage per capita.

Whether we consider the foreign or the domestic situation, it seems clear that American agriculture approaches a turning point. There is urgent need to adjust our national agricultural policy, particularly our land policy, to the changing conditions and outlook. Extensive areas of public lands in the United States went into private ownership under the homestead policy during the decade or more beginning in 1913. In the war period, under the influence of high prices, agriculture was further expanded into areas where normal prices could not support it. Although there has been little expansion of our farming area as a whole during the past decade, our 500,000,000 to 600,000,000 acres of unused potential crop land, though mostly of low grade or requiring costly drainage or irrigation, are a constant incentive to overexpansion. Most of the land is in private ownership, and the owners naturally want to get it into use. It would probably be inexpedient and, perhaps, constitutionally impracticable, for the Federal Government to regulate the utilization or settlement of private lands. Much progress, however, could be accomplished through the widespread dissemination of information concerning the long-time outlook for different lines of production in various parts of the country, and concerning the uses for which particular classes of land are economically adapted. This implies an economic classification of our land resources, which should be readjusted from time to time to conform to fundamental changes in economic conditions. Such a classification would make it easier to discourage ill-advised and unnecessary expansion. It would lessen the risks of new settlement. It would designate land that should be withdrawn from cultivation and land that should be acquired for public uses. It would serve, in short, as the basis of a national land policy.

Replanning of Research Needed

This would require some replanning of the investigational and extension work of the department and the State colleges and experiment stations. Their work would be directed more toward synthesizing research results and coordinating research activities to develop more definite conclusions concerning the economic adaptation of the differ-

ent kinds of land to various possible uses.

The department has already directed a considerable share of its resources to the study of land utilization. The Bureau of Chemistry and Soils, in cooperation with State experiment stations, is classifying the soils of the Nation and studying their properties. It is investigating the extent, causes, and prevention of erosion. The Bureau of Agricultural Engineering is studying drainage, irrigation, and land clearing. The Bureau of Plant Industry investigates forest pathology. The Bureau of Entomology studies insects that injure forest trees. The Forest Service carries on research in silviculture, forest management, and methods of using timber and timber products; besides administering the grazing facilities of the national forests, it gives attention to problems of range utilization. Recently the Forest Service has expanded its research in the economic aspects of the utilization of land for forestry and grazing. It is studying forest taxation and the disposition of tax-delinquent forest lands. A general inventory is being made of the timber resources of the Nation.

About 10 years ago a Division of Land Economics was established in the Bureau of Agricultural Economics. It has devoted part of its attention to the economic aspects of land utilization. The area of our country is so large, however, that it would have been impracticable for so small a unit to undertake to work out the land-utilization problems of local areas for any appreciable part of the country. A few local studies have been made, mainly with a view to determining the character of the problems of sample areas and developing methods of investigation. The work has been mainly confined to studying the conditions that affect the need for land, and to estimating the extent of the Nation's agricultural land resources available for different purposes.

The time has come when both the Federal Government and the States should devote more attention to the task of determining for specific areas what uses of land are most economical. This is the necessary basis of rural planning. As the proper economic uses of land are determined, a vigorous extension program should be developed to stimulate individuals and communities to adjust their economic life

to a sound program of land utilization.

# **Emergency Conditions Demand Action**

Although the attainment of agricultural prosperity will ultimately depend on the development of a more orderly and efficient system of land utilization, it is necessary to approach the problem by dealing with emergency conditions. Economic life in many farm communities has been disorganized by recent changes in the value, utilization, and ownership of land. In some areas many farms have been abandoned. The resources of many communities have been depleted by timber cutting, and unfavorable conditions of the lumber market have reacted on the value of standing timber. As a result, many farmers and holders of timberland can not meet taxes and other carrying charges. Millions of acres of farm or forest land have passed into various stages of tax delinquency. Extensive areas have been taken over by creditors through foreclosure. The fiscal problems of local governments have been intensified, and provisions for schools and other public services rendered uncertain.

In such areas the situation could be clarified through the collaboration of Federal and State agencies in determining the economic outlook for various land uses, and on this basis formulating a program of economic, institutional, and fiscal reorganization. In general, lands now in private ownership should continue to be privately owned and utilized. Where previous conditions have resulted in farms too small or too large for present conditions, reorganization plans should be developed and put in operation with the aid of local business interests and local and national credit agencies.

# Utilization By Private Agencies

In certain areas improved methods of forest management, including in some cases the consolidation of scattered tracts and cooperative measures for cutting, handling, and marketing, may permit a profitable utilization by private agencies of timber holdings and wood lots. Profitable private utilization can often be facilitated by changes in methods of taxation or assessment. Probably the Federal Government and the States should assume more responsibility for guiding land utilization and settlement and for determining the feasibility of drainage and irrigation projects. It is probable that assistance may be rendered to farm owners in the more effective disposition of the mineral resources beneath the surface of their farms. It may be desirable gradually to broaden the public acquisition and administration of lands not adapted to private utilization. Recognized objectives in public ownership of land, such as watershed protection, forest demonstration, and the provision of national and State parks and wild-life refuges should not be the only consideration. Other public objectives may well be kept in view. Sparse and scattering occupancy adds to the burden of maintaining schools and other public This cultivation of submarginal farm lands increases the competition farmers have to meet, frequently with no advantage to the occupants of the submarginal farms. The maintenance of permanent local forests should be promoted for farming communities needing timber and timber products, raw materials for local industries, local markets, and part-time employment of the population. Lands that can not be privately utilized without excessive soil erosion or other wastage of natural resources should be removed from private

ownership.

The existence of large areas of tax-delinquent land provides an opportunity for broadening the basis of public ownership. Where private ownership is inadvisable, such lands should not be forced into private ownership through resales. What part the Federal Government and the States, respectively, should take in the development of a broader program of public ownership is a matter for future determination. Clearly, however, Federal and State programs of acquisition should be coordinated in harmony with a definite policy of land utilization.

# Some Principal Requirements

The central problem is to correct or avoid mistakes in the major uses to which land is put and to safeguard the public interests in the utilization of the land. Summarizing, it seems desirable to—

(1) Encourage farmers who are operating poor land to find better opportunities in agriculture or other occupations. Poor land includes land which, though temporarily adapted to commercial farming, is

peculiarly subject to wastage by erosion.

(2) Promote compact communities which will permit maximum economy of schools, roads, and other institutions by encouraging abandonment of areas, especially of poor land, where occupancy has become extremely scattered through abandonment, delinquency, etc.

(3) Create the conditions that will make possible the use for which the land is best adapted, including fire protection for forests, modifications in taxation, consolidation of tracts, and the necessary transportation facilities, and disseminate the requisite technical information.

(4) Insure the maintenance of the forest or range areas requisite for a permanent and stable agricultural economy in regions where agriculture is closely interrelated with forestry, or with use of the range.

(5) Discourage the overexpansion of agriculture.

(6) Prevent the expansion of agriculture into areas poorly adapted for the purpose and the development of a sparse type of settlement that will mean heavy collective costs for public services. This includes discouraging the development of irrigation and drainage by collective action except when agriculturally and economically feasible.

(7) Promote the adjustment of land valuation and the tax burden to what the particular use for which the land is adapted is capable of

supporting.

(8) Develop those types of land that will contribute to watershed protection, flood control, adequate provision for future timber

requirements, and the protection of range resources.

I consider the land-use program to be of such importance that I have called a national conference of farm leaders to discuss it comprehensively. This conference will be attended by representatives of this department, the land-grant colleges and experiment stations, the Federal Farm Board, State land departments, mortgage companies, farm organizations, railroads, banks, and others.

#### **FARM-LAND VALUES**

Developments unfavorable to agriculture during 1930 were reflected by severe declines in farm real-estate values in nearly all parts of the country. Not since 1922 had values dropped in any year to such an extent as during the year ended March 1, 1931. The index of estimated value per acre for the United States as a whole decreased from 115 per cent of the pre-war level to 106 per cent. The indicated declines were not only more severe than those of the previous year, but also far more general. Only two States escaped reductions in 1930,

while in 1924 only 24 had reductions.

The sections reporting the greatest declines in farm-land values, relative to 1930 levels. were the West North Central and West South Central States. Each of these groups of States had declines averaging 11 per cent. The East North Central and South Atlantic groups each reported average declines of 9 4 per cent. The East South Central showed an 8.6 per cent decrease, the Middle Atlantic 4.7, the Mountain States 2, the Pacific States 1.4, and the New England States 0.8 per cent. The States reporting the greatest percentage of decline were Arkansas, North Carolina, Missouri, South Carolina, and Iowa.

Accompanying the downward movement of farm-land values was a general fall in the number of voluntary sales, and a striking increase in the number of forced transactions. During the year ended March 15, 1930, the average number of voluntary sales for the country as a whole was 23.7 farms per 1,000. During the year ended March 15, 1931, the average number dropped to 19 farms per 1,000. Forced sales, on the

other hand, increased 25 5 per cent.

An appreciable and rather general demand for farms to rent resulted from the influence of urban unemployment, which caused city people in larger numbers to seek the cheaper food, fuel, and shelter available in the country, and discouraged farm people from moving to cities. Because of the difficulty of financing farm sales, the weak financial condition of the unemployed, and a general disinclination toward buying on a declining market, the accompanying effect on the demand for farms to buy was insufficient either to increase the number of farms sold voluntarily, or to increase appreciably the total number of sales. An increasing proportion of the farms sold voluntarily were bought by men who were formerly tenants, and by nonlocal residents.

# Decline Reflects Drop in Earnings

Farm-realty values reflect farm earning power, current and prospective. Hence, the fundamental cause of the decline in farm-property values in 1930 was the slump in farm incomes. As already noted, gross income from agricultural production in 1930 was about 22 per cent less than in the previous year, though the physical volume of production was only about 2 per cent less. It is estimated that farm-operating costs on the other hand declined only from \$3,152,000,000 to \$2,890,000,000. Wages paid to hired labor declined only slightly and taxes still less. Accordingly, the fall in net incomes was proportionately more than the fall in gross incomes. Net income available as a return for all the capital invested in agriculture, and as a reward for the labor and management of the farm operator and his family dropped to \$4,669,000,000, as compared with \$6,751,000,000 in 1929.

This net income may be considered from two standpoints. If pay for the labor of the farm operator and his family is subtracted at current wage rates for hired labor, there remains only \$573,000,000 as a return for all capital and management devoted to farming. If, on the other hand, adjustments are made for the portion of taxes and operat-

ing expenses paid by landlords, and for payments made by farm operators to nonfarmers for rent and for interest on loans made by them for use in production, the income from production not only fell short by \$346,000,000 of paying farm operators and their families a rate of return for their work equal to that paid to hired hands, but also left no

return for the farm operators' own capital and management.

The renewed declines in income came at a time when the readjustment following the 1920 depression was still incomplete. Although land values had begun to show some signs of stability, the amount of land in the hands of involuntary holders was still at high levels, forced sales of farm land still held an unusually prominent place in the real estate market, and long-time financing of agriculture was conservative. The development of 1930 and 1931 have aggravated the situation, and reemphasized the importance of rehabilitated purchasing power for agriculture if further liquidation is to be avoided.

## Increase in Tenancy

Along with the increase in the holding of land by involuntary holders which has resulted from the decline in farmers' equities has come an increase in the proportion of tenant-operated farms. This proportion was 42.4 per cent in 1930 for the United States as a whole, as compared with 38.6 per cent in 1925. Increases in tenancy were reported in every State except Connecticut, New York, New Jersey, Pennsylvania, Delaware, Arizona, and South Carolina. Relatively small increases in tenancy occurred between 1910 and 1925. Rapid increases followed the depression of the nineties, partly as a result of that depression and partly because the area of good land available for homesteading was diminishing. During the half century that questions on tenure have been included in the Federal census (1880–1930), the percentage of tenant-operated farms has increased from 25.6 to 42.4. The present high proportion of tenant farms may involve significant consequences to the general welfare, and attention may well be directed to the probable social effects.

#### TAXES

Farm real-estate taxes showed a slight decline in 1930 for the first time in the 17 years covered by the records of this department. Taking farm real-estate taxes per acre in 1913 as a base represented by 100, the index for such taxes was 249 in 1930, as compared with 250 in 1929. In amount the decline was insignificant, but it indicated a halt in the long upward trend. It did not bring any measurable relief to the farmers because agriculture's capacity to carry the burden declined far more. As we know it to-day, the farm-tax problem is largely a development of the last decade and a half. Taxes increased steadily from 1920 to 1929, inclusive, though farm earnings were low and farm valuations persistently declined. The situation was bad enough before the current depression began. It is critical now.

In the main the farm-tax problem rests with State and local governments, which in many instances are recognizing the fact in practical ways. Forty-four State legislatures met this year, and most of them considered taxation in relation to agriculture. Relief measures advocated, and in some cases enacted, fell broadly in two categories: Those designed to shift part of the cost of State and local government from

general property to incomes and other sources of revenue, and those designed to reduce public expenditures. Property taxes rest principally on real estate; hence farmers and other real-estate owners are generally required to pay more than their fair share. This injustice is coming to be widely recognized, and State income taxes are proposed

as a partial remedy.

Idaho, Utah, and Vermont this year joined the list of States having personal and corporate income tax laws. Vigorous but unsuccessful attempts were made to introduce the income-tax principle in several other States. Oklahoma's income tax law was made more effective by an increase in the rates. North Carolina, Missouri, and Wisconsin likewise increased their income-tax rates. Several States increased their gasoline taxes. Some of them arranged to apportion part of the new revenue among minor civil divisions to help defray the cost of local roads. Nearly all of the revenue collected in gasoline taxes in 1929 was devoted directly or indirectly to the construction and maintenance of rural roads and city streets.

## Legislative Measures Taken

Practically all the States whose legislatures met this year dealt in one way or another with the problem of reducing public expenditures. Various expedients were adopted. Taxing authorities showed themselves keenly aware that a cut in the amount of the tax burden is as necessary as a more equitable distribution of the load. They were particularly impressed with the growth of tax delinquency. Much land over large areas reverted to public ownership through the inability of its former owners to pay the taxes. In northern portions of the Lake States the tax base of many local governments has shrunk so much that the continued existence of these governments is threatened. Inflexible taxes that take no account of crop failures, price declines, and other causes of distress have precipitated widespread farm insolvency. In such circumstances local budgets have to be pared through sheer necessity, and tax systems must be modified and improved.

Taking the country as a whole, the work of tax reform is barely begun. Nearly four-fifths of all State and local taxes are derived from the general property tax. When real-estate values fall as they have done in the United States since the war, assessments decline much less rapidly, and tend to exceed the current selling value of the land. The necessary twofold remedy, consisting of reduced public expenditure and the development of new sources of revenue, should be invoked for

reasons of expediency as well as of justice.

#### AGRICULTURAL CREDIT

Local farm-credit facilities, barely adequate in normal times, were unprepared to handle the situation resulting from the 1930 drought and recent depression in farm prices. Accordingly, Congress passed legislation to supplement existing credit facilities. It appropriated emergency funds the administration of which was placed in the Department of Agriculture. All told, the final session of the Seventy-first Congress assigned \$67,000,000 for various forms of agricultural credit. It made \$45,000,000 available for loans to farmers who suffered from the 1930 drought. This money was for loans for the pur-

chase of seed, feed for livestock, and fertilizer. An additional \$2,000,-000 was appropriated for the same general purposes in a specific area that had suffered from storm and flood in 1929. Another appropriation of \$20.000,000 was made for agricultural rehabilitation (which term included necessary items for farm production) and for loans to individuals to buy stock in agricultural-credit corporations, livestock-loan companies, and similar organizations. Advances made to assist farmers in the drought-stricken areas are dealt with in some detail later in this report. I shall deal here mainly with the other emergency credit provided to supplement the credit obtainable by farmers from other sources, such as the commercial banks, the Federal land banks, the joint-stock land banks, and the intermediate credit banks.

Though much important Federal legislation affecting agricultural credit has been put in effect during the last decade and a half, agricultural-credit conditions generally were extremely unsatisfactory this year. This was not wholly a reflection upon the existing farm-credit facilities. It resulted largely from the depressed condition of agriculture, which weakened banking institutions. More than 1,300 banks in the United States failed in 1930, and 932 failed in the first eight months of 1931. More bank failures in agricultural areas have taken place in the last few years than in any other previous equal period, though the suspensions this year included an increased proportion of city banks. The injury to agriculture was not confined to the loss of deposits; it included a great shrinkage in the amount of agricultural credit available. When local confidence is disturbed, country banks find it more difficult to draw on the larger money centers. Hence their supply of loanable funds comes to depend almost exclusively on their local deposits, which naturally decline if banking conditions seem insecure. In such circumstances, moreover, country banks are obliged to invest an increased proportion of their funds in liquid assets outside their communities as a protection against unusual withdrawals.

# Local Conditions the Controlling Factor

Some idea of the extent to which local supplies of agricultural credit have recently been reduced may be gained from the fact that in the middle of 1931 net demand deposits of member banks of the Federal reserve system, located in places of less than 15,000 population, in 20 leading agricultural States, not including California, were about 20 per cent lower than the monthly average for the period 1923-1925. Mainly this decline reflected reduced income from agricultural production. Ordinarily deposits in country banks are a revolving fund available for local loans. When the liquidation of loans made by the country bank is retarded by farm depression, the fund loses its revolving character, and even good creditrisks must be refused. Emergency credit provided by the Federal Government materially relieved this difficulty. As mentioned elsewhere, Federalloans to purchase seed, feed, and fertilizer and for agricultural rehabilitation totaled approximately \$47,000,000. In addition the Federal Government advanced \$1,327,000 to individuals for the purchase of stock in agricultural-credit corporations and livestock-loan companies. Loans of this type enabled credit agencies that rediscount paper with the Federal intermediate credit banks to expand their credit facilities by several times the amount of the new capital provided. Hence the full benefit of the advances was much greater than might be supposed from their relatively small total.

Advances of this character, as already noted, were provided for in the \$20,000,000 appropriation for agricultural rehabilitation and loans to individuals to buy stock in credit institutions. Under congressional authority the Secretary of Agriculture, after conferring with officials of the Federal intermediate credit banks and the Federal Farm Loan Board, set aside \$10,000,000 for the latter purpose. A National Advisory Loan Committee, consisting of Lewis T. Tune, chairman, St. Louis, Mo.; B. C. Powell, Little Rock, Ark.; and B. F. Cheatham, Washington, D. C., was appointed to assist in administering the fund. Advisory committees were also appointed in 22 drought-stricken States to make recommendations regarding loan applications. Up to September 1, 1931, advances had been made representing 788 individual loans to stockholders in 49 credit corporations and livestock-loan companies.

# Opportunities for Credit Corporations

An important field of usefulness lies open to agricultural-credit corporations in those communities where existing local credit facilities are inadequate. They do not depend for their supply of loanable funds on local sources, but have access to the central money market through their rediscount facilities. Hence they can obtain advances on the basis of actual credit risks without being limited by the necessity of mobilizing funds locally. In 1930 the Federal Farm Loan Board made a regulation authorizing an increase from 2 and 2½ per cent to 3 per cent in the spread allowed agencies rediscounting with the Federal intermediate credit banks. In other words, it permitted rediscounting agencies to charge more for their services and consequently to provide better facilities and better management. With a 3 per cent margin between the rate of interest paid and the rate of interest received, these organizations can function more safely and more efficiently than was formerly possible. This advantage should promote the organization of more agricultural-credit corporations and should help to make capital available to formers more cheaply and more abundantly. Acting through the Federal intermediate credit banks, they can create new channels through which loanable funds may flow readily from the principal money centers to farm communities.

# Varying Interest Spread Needed

A given operating spread might be excessive for local credit institutions in some parts of the country and yet prove inadequate in other Under usual conditions, and even more so at the present time, country banks in the South and West must vary from their customary rates in order to take advantage of the rediscount privileges offered by Federal intermediate credit banks. Few bankers have deemed this a feasible policy. Funds of the Federal intermediate credit banks have hitherto reached farmers principally through agricultural-credit corporations and livestock-loan companies. With the year-round volume of business enjoyed by livestock-loan companies, the present 3 per cent operating spread may prove ample. It is doubtful, however, if it will cover the cost and losses incurred in financing the production of those crops which involve a relatively hazardous and costly type of business. In this type of financing loans are so seasonal that credit corporations can actually earn little more than half the annual rate which is charged.

Limitations on interest rates were authorized by Congress for the protection of farmer borrowers and to prevent exploitation of Federal intermediate bank credit by local credit institutions. The accomplishment in these directions, however, has been overshadowed by the failure of Federal intermediate bank credit to reach farmers in the volume needed. To a considerable extent this appears to be due to the fact that approved spreads have often failed to recognize local operating requirements. In such cases the rate limitations have obstructed the channels through which Federal intermediate bank credit might flow to farmers. A system of spreads, based on variations in local conditions and requirements, would appear to be more practicable than a uniform spread for all areas and types of loans.

#### Emergency Credit Benefited Many

Congress substantially recognized the principle that agricultural credit should not depend too heavily on local funds when it created the intermediate credit banks. It took an important further step in the same direction in providing the emergency credit here described. The innovation has potentialities only faintly indicated by the extent to which the fund available for capitalizing agricultural-credit corporations has been utilized up to the present. So far less use has been made of the new facilities than was originally expected. Many interested groups had not enough time to obtain subscriptions for stock and to organize operating corporations so as to take care of 1931 crop requirements. Emergency-credit requirements of farmers in the drought area were largely taken care of in other ways, principally through advances from the \$45,000,000 appropriation for loans to purchase seed, feed, and fertilizer. Additional financing through credit corporations was consequently less urgent. Nevertheless much valuable preliminary work was done. The National Advisory Loan Committee devoted much effort to an educational campaign in which radio broadcasting, press releases, and other means were used to acquaint farmers with the advantages of organizing local agricultural-credit corporations. Farmers thus became better acquainted with what they can do for themselves by organizing to rediscount their paper through the intermediate credit banks.

The rapid readjustment which has been forced upon agriculture as a result of the marked decline in farm-commodity prices since 1920 has likewise caused material changes in the usual supply of credit available to farmers. Every effort, therefore, should be devoted to strengthening existing credit agencies, and whenever possible, consideration should be given to such measures as would tend to increase their usefulness.

#### DROUGHT RELIEF

Excluding the \$10,000,000 set aside to organize new or to strengthen existing agricultural-credit corporations, the department, as already indicated, had \$57,000,000 available for drought relief. More than 385,000 applicants borrowed approximately \$47,000,000 to purchase seed, fertilizer, feed for livestock, and fuel and oil for power machinery, and for agricultural rehabilitation.

Widespread need resulted from the severe drought that prevailed during the 1930 crop-growing season. The worst effects were concen-

trated in a triangular section of the Potomac, Ohio, and Mississippi Valleys running from southern Pennsylvania, Maryland, and Virginia to southern Kansas, to Alabama, and to Texas. Neighboring States felt the drought more or less. How its effects were geographically distributed is indicated by the composite yield per acre of all crops in 17 States principally affected. This composite yield is expressed as a percentage of the average for the 10-year period 1919–1928. It was 87 in Pennsylvania, 73.4 in Maryland, 67.7 in Virginia, 56.9 in West Virginia, 79.3 in Ohio, 84.4 in Indiana, 83.1 in Illinois, 60.5 in Kentucky. 75.6 in Tennessee, 66.8 in Missouri, 62.8 in Arkansas, 89.8 in Kansas, 71.2 in Oklahoma, 86 in Texas, 91.5 in Mississippi, 100.3 in Louisiana, and 111.3 in Alabama. Yields above the 10-year average in Louisiana and Alabama are explained by the fact that only certain sections in those States were drought stricken, and that cotton, their principal

crop, withstood the drought surprisingly.

In most of the drought-stricken States gross income from farm production was much below the average for the 5-year period 1924-1928. It ranged from 4 per cent below that average in Pennsylvania to 46 per cent below it in Arkansas and in Oklahoma. In Mississippi the gross income was 39 per cent below the 5-year average, in Texas 37 per cent below, and in Alabama 29 per cent below. Feed production was most affected, wheat and rye and many of the vegetable crops having been harvested before the drought became severe. Rice was not much hurt, since it is grown under irrigation. Pastures were extremely scant. In fact, for the entire 1930 pasture season the condition of pastures in the drought States was only from 50 to 80 per cent of the 10year (1920-1929) average. Short supplies of grain and hay and poor pastures reduced the output of animal products materially. In the 17 States mentioned, milk production percow on August 1, when the drought was at its height, was 11.3 per cent below the output on August 1, 1929. Egg production per hen was 9.5 per cent lower. Nevertheless, the production of milk and eggs in these States for the full year 1930, with some exceptions in South Central States, was above the average of the 5-year period 1924-1928, both in total volume and in output per cow and per hen. A mild autumn and winter enabled farmers to economize their livestock feeds, and the drought did not seriously affect the meat supply of 1930. In some areas it temporarily increased market supplies through forced marketing. Beef production in the 17 States was slightly greater than in the previous year; and sheep and lamb production was greater also. The production of calves and hogs declined, but not as a result of the drought.

#### Much Privation Caused

Statistics, however, give a poor impression of the human side of the drought situation. Tens of thousands of farm families had their savings swept away, and even their subsistence endangered. Usually when weather conditions reduce production prices rise. No such partial compensation came to the drought-stricken areas in 1930 because demand and prices declined under the impact of the world depression. For the little they had to sell farm families got extremely low unit prices. Feeds had to be moved into deficit areas, and in many localities it was necessary also to supply food. Aid was rushed by the Red Cross and by State and local agencies. It was supplemented by Fed-

eral action when Congress, on December 20, 1930, passed the first drought-relief resolution and charged this department with the

administration of the funds provided.

Field offices for the handling of applications for loans were established in Washington, D. C.; Memphis, Tenn.; Fort Worth, Tex.; St. Louis, Mo.; and Grand Forks, N. Dak. The making of loans began about February 1, and continued at a rapid rate through the late winter and early spring months. Several hundred temporary workers were employed in these field offices in handling the applications for loans, and valuable assistance was given in the examination of applications by a large number of district agents and specialists from the State extension forces. Loans were made in 1,646 counties in 31 States.

In each county a local seed-loan committee was set up, usually consisting of a prominent banker or other business man and two leading farmers. These committees examined all applications for loans originating in their counties and made recommendations thereon to the department field offices. On approval of the applications for loans at the field office, payment was made to the borrower by check, the transaction in a large proportion of cases being completed in less than a week from the time application was made. As borrowers did not need all their funds immediately on the approval of their applications, payments in many cases were made in two or more installments, as funds were required. These installments were paid only after the receipt of a report from the borrower as to the purposes for which the initial advance had been expended.

All applicants for loans were required to agree to plant a garden, and also a sufficient acreage of feed crops to provide feed for their livestock. This policy was in line with that generally advocated by the agricultural colleges and extension forces in the Southern States, and followed

also by many agencies that assist in financing farmers.

# Loans from the Various Appropriations

Out of the \$45,000,000 appropriation, 279,466 loans were made aggregating \$39,716,797. Out of the \$20,000,000 appropriation, 91,075 loans for agricultural rehabilitation were made aggregating \$5,430,783. Out of the \$2,000,000 appropriation, 14,651 loans were made, aggregating \$1,908,181. All told, 385,192 applications were approved for

loans aggregating \$47,055,761.

As loans were made from the rehabilitation fund to many farmers who had already borrowed from the \$45,000,000 appropriation, the number of individuals to whom loans were made is somewhat less than the total shown. On the other hand, many loans were made to landlords, each of whom financed several farm families, so that the total number of farm families financed was probably between 350,000 and 400,000. The average loan was slightly less than \$150, and in certain States, such as Oklahoma and Kentucky, the average was less than \$100. The small size of these loans shows clearly that farmers generally economized on production expenses and conducted their farming operations in 1931 at the lowest possible cost.

Federal and State extension forces helped farmers, not only in using wisely the money advanced to them, but in utilizing other resources. Farm men and women were urged to plant fall gardens of rapidly maturing vegetables. They were shown how to preserve poultry, beef, vegetables, and eggs. They were advised about cheap, wholesome

foods. As a result the food problem was made less difficult. Meat canning relieved many farmers of the necessity of purchasing feed for their animals, or of selling them at low prices, and at the same time provided a meat supply. Farm women were taught how to renovate and remodel old garments. Practical help was given also in the choice and use of emergency rations for livestock. Farmers were assisted in culling their herds and flocks and encouraged to plant forage crops for fall and spring pasture.

## Feed and Forage Supplies Located

Extension agents located supplies of feed and forage, and worked out plans for distributing feedstuffs at the lowest possible cost. County agents helped farmers to get the benefit of reduced freight rates granted by railroads on the movement of hay, feed, and water into drought areas, and on the outward movement of livestock. They and other representatives of Federal and State agencies promoted crop adjustments suited to market needs. In the wheat States they urged the elimination of wheat as a major source of income on farms of poor soil or difficult topography. In the cotton States they emphasized the necessity of a balanced system of agriculture with feed and food crops holding an adequate place in the crop organization.

Table 1.—Loans made to individual farmers in each of the States most seriously affected by drought

				_				
State	From \$45,000,000 appropriation		From \$20,000,000 appropriation		From \$2,000,000 appropriation		Total	
Alabama Arkansas Georgia Indiana Kentucky Louisiana Mississippi Missouri Montana North Carolina North Dakota Oklahoma South Carolina Tennessee Tevas Virginia West Virginia All other States	Number 14, 406 51, 831 13, 231 15, 650 25, 129 21, 738 15, 029 12, 738 16, 673 20, 379 20, 379 20, 375 551 286, 040 13, 426	Dollars 2, 211, 480 7, 606, 443 1, 976, 690 777, 542 2, 247, 645 2, 997, 342 3, 697, 495 2, 031, 140 2, 071, 210 1, 903, 235 1, 587, 587 1, 397, 372 89, 139 3, 528, 249, 258 2, 179, 933 5522, 480 37, 255, 294 2, 461, 503	Number 3, 812 26, 675 321 388 8, 103 10, 205 9, 863 7, 92 3, 433 4, 099 7, 394 9, 178 3, 563 495 90, 721 354	Dollars 193, 649 1, 604, 661 14, 503 25, 388 340, 418, 79 271, 642 10, 030 153, 855 224, 517 430, 669 502, 927 176, 134 18, 098 5, 409, 476 21, 307	Number 1,535 4,126	267, 438 545, 877 153, 912 895, 009 1, 862, 236 45, 945	Number 19, 753 78, 506 17, 678 6, 038 33, 237 31, 606 18, 119 17, 33 18, 869 8, 156 24, 067 29, 557 20, 030 6, 046	Dollars 2, 672, 567 9, 211, 070 2, 537, 070 802, 930 2, 588, 076 3, 190, 435 4, 439, 374 2, 302, 782 2, 201, 240 2, 211, 092 1, 597, 587 1, 621, 889 2, 306, 572 3, 085, 485 2, 384, 167 540, 578
Grand total	279, 466	39, 716, 797	91,075	5, 430, 783	14,651	1, 908, 181	385, 192	47, 055, 761

#### UNEMPLOYMENT RELIEF

Congress also appropriated large sums to the Department of Agriculture for types of work that contributed to unemployment relief. In most cases the funds appropriated were additions to moneys that would ordinarily have been provided for department activities. In some cases, however, department activities were anticipated by making funds, which ordinarily would not have been available until after July 1, 1931, available during the winter and spring months, for the relief of unemployment. Increased funds were provided for the con-

struction of Federal-aid highways, for roads and trails in the national forests, and for roads traversing the public domain. Various sums were made available to give employment in the repair, construction, and improvement of laboratory buildings, farm facilities, forest-protection facilities, and other equipment used in the department's research and service work. Altogether more than \$100,000,000 was appropriated for objects related to unemployment relief. Emergency employment was directly provided for varying periods for nearly 200,000 men, and indirectly for a much larger number in industries supplying necessary materials and services. Where possible in employing men the department gave preference to the heads of families.

Federal-aid road construction was accelerated as early as April, 1930, when Congress authorized for this purpose an additional \$50,-000,000, bringing the total Federal contribution for Federal-aid roads to \$125,000,000 effective with the fiscal year 1932. The actual amount expended in the fiscal year 1931 from the regular Federal-aid highway appropriations was approximately \$135,600,000, including some \$26,-000,000 from the \$125,000,000 appropriation for 1932, which was made immediately available. This fund provided work for farmers distressed by the 1930 drought, as well as for unemployed urban workmen. A full discussion of unemployment aid resulting from the enlarged program of the Bureau of Public Roads is given in the next section of this report.

### Work in National Forests

Road work in the national forests provided considerable employment. Forest improvement already under way was speeded up, and \$3,000,000 was added to the regular fund for the construction of forest roads and trails. This work created a need for more equipment, such as tractors, graders, power shuttles, compressors, rock crushers, and trucks. In the first half of the current year the department purchased \$145,000 worth of such equipment. Where unemployment was extreme the department rotated available men in construction crews. For the fiscal year 1932, \$800,000 was made available to build a forest products laboratory at Madison, Wis., and \$150,000 for white-pine blister rust control in addition to the usual appropriation for that

purpose.

Various measures to relieve unemployment were adopted by the Forest Service. In Arkansas, for example, many farmers living in or near a national forest faced destitution. In this area several hundred men were enabled to support their families by cutting and selling stave bolts. Other men were employed in making silvicultural cuttings to improve the timber growth. For this purpose one forest supervisor disbursed \$12,000 in wages during a 4-month period, giving work to those who needed it most. Construction plans were modified where possible to permit forest road building during the winter. some places construction crews were alternated. When emergency funds became available for forest improvements action was started in all the national forests and plans made looking toward the progressive equipment of the forests with roads, trails, lookout houses and towers. telephone lines, firebreaks, cabins, barns, inclosed pastures, and drift fences. Comprehensive plans for carrying on such work make it possible to forward it as circumstances warrant. Decentralized organization gives the Forest Service machinery for getting new work under way rapidly under the supervision of trained local men. As soon as plans for the use of the \$3,000,000 emergency appropriation were completed, allotments to each region were telegraphed to regional foresters and to forest supervisors. Awards for the purchase of equipment followed and in some cases equipment was on the ground within 10 days. By the end of January, 1931, 3,083 men had been given employment under the appropriation; by the end of May the number had increased

to 4,558.

Additional funds for emergency improvement by the Forest Service became available under an act approved February 6, 1931, which set aside \$354,800 for insect-control work, forest administration, and range improvements on the national forests. In the regular agricultural appropriation act of February 23, 1931, a provision was included making available immediately certain 1932 appropriations, mainly for forest protection. In June, 1931, the total number of men employed in this work, including those who were given temporary employment through the use of regular 1931 appropriations, was 21,658. By the end of the fiscal year, practically all the emergency funds had been expended or obligated, and about half of the 1932 appropriations made available for use in 1931 had been expended.

## Other Emergency Appropriations

The emergency appropriations also included \$300,000 to the Bureau of Biological Survey for the fiscal year ended June 30, 1931, for building dams, fences, telephone lines, electric, water, and septic-tank systems, and cold-storage plants; for surveys of wild-life refuges; and for the control of injurious rodents and predatory animals. About twothirds of the expenditures made from this appropriation were for personal services. An emergency fund of \$75,000 was provided for the construction and improvement of farm and laboratory buildings required by the Bureau of Plant Industry, and for necessary installations in connection with the field activities of that bureau. An appropriation of \$35,000 was made for construction, by the Plant Quarantine and Control Administration, of a car-fumigation plant at Presidio, A \$58,000 emergency fund was made available to the Bureau of Animal Industry for construction and development work at its farms at Beltsville, Md., and Miles City, Mont. Employment was furnished by the bureau to many men in clearing land, establishing pastures, building fences, and in constructing laboratories and other buildings. A total of \$87,000 was made available to the Bureau of Dairy Industry for the construction of buildings and other improvements at dairy experiment stations at Beltsville, Md., Woodward, Okla., and Ardmore, S. Dak. Appropriations aggregating \$83,480 were also provided for improvements to the department's buildings in Washington, D. C., including the modernization of its elevator and electrical systems, resulting in additional employment opportunities.

Other bureaus in the department helped to relieve unemployment or to mitigate its effects. The Bureau of Home Economics, for example, prepared economical and healthful food budgets, and carried on necessary educational work, in cooperation with the Extension Service. They cooperated with the American Red Cross in ascertaining the types of help needed and the resources available. More than 750,000 bulletins and posters were distributed in drought and unemployment

relief work.

#### PUBLIC ROADS

Between January and September there were employed on Federalaid road construction and road construction in the national forests and parks an average of 100,000 men. During this period these men worked the equivalent of 150 days at an average wage of \$4 per day. On this road work, in which the Federal Government participated either as a cooperator with the States or independently, there was paid to labor employed directly on the roads approximately \$60,000,000.

Actually the number of men employed varied during the period from a minimum of 31,000 in January to a maximum of 164,700 in July. By April there were 97,500 at work, and during the active construction season from May to August, inclusive, the number averaged nearly

150,000.

These figures represent the employment offered directly in the construction of the roads. For every person employed directly there are probably at least two indirectly employed in the production and transportation of road materials and equipment. If that be the case, the road-building work in which the department participated occupied an average of approximately 450,000 men during the active season, and the equivalent of 300,000 men for the period from January 1 to September 1, 1931.

The increase in employment offered on Federal and Federal-aid road work this year is indicated by comparison of the 154,450 persons reported as employed directly during June, 1931, with the 64,000 em-

ployed during the same month of 1930.

The increased employment afforded by the road work during the fiscal year 1931 is the result of the increased appropriations authorized, the early apportionment of the Federal-aid authorization, and the emergency legislation of December 20, 1930, especially the \$80,000,000 appropriated as an advance to the States to be used by them in lieu of State funds in order to get work under way early in the calendar year 1931. This appropriation is not an outright grant, but merely a loan which the States are to repay over a period of five years by deduction from their future apportionments of regular Federal-aid funds beginning in the fiscal year 1933

# Cooperative Projects Give Greatest Aid

Although the independent Federal construction on national-forest and national-park roads was increased, the Federal-aid road work in which the cost was shared with the States provided by far the greatest amount of employment, and the increase in volume of this work during the fiscal year is the result of three separate actions

# Increased Appropriations

First was the authorization of an additional appropriation of \$50,000,000 for the fiscal year 1931. This addition, bringing the total authorized for the current fiscal year to \$125,000,000, was approved April 4, 1930, and immediately apportioned. It had the prompt effect of increasing the work undertaken during the summer of 1930.

On September 1, 1930, the appropriation of \$125,000,000 authorized for the fiscal year 1932 was apportioned. Normally the apportion-

ment would not have been made until the latter part of December. The advancement of the date added to the amount of work undertaken during the autumn and carried over as the bulk of the work

current during the early months of 1931.

Stimulated by the enlarged Federal-aid apportionment, the volume of construction work carried on and completed during 1930 was further increased by the exceptionally long, dry working season. This resulted in an abnormally large expenditure, and left many States with seriously depleted revenues which could not be renewed except by action of the State legislatures. As in many cases the sessions of the legislatures were not convened until after January 1, it seemed probable in December that unless some further action was taken by the Federal Government the resumption of construction work in the spring would be delayed because of a lack of State funds with which to match the available Federal apportionments.

# Congress Authorizes Advance in Program

To avoid this possibility Congress, on December 20, appropriated \$80,000,000 to be apportioned among the States in the same manner as the regular Federal-aid authorizations and used by them to match the Federal-aid funds. As it was the purpose to encourage the beginning of work as promptly as possible in order to provide early relief to the unemployed, the amount of the apportioned funds which the States could claim was limited to the amount that should be actually

expended by September 1.

This method of stimulating and advancing the construction program proved effective. Within a month \$15,000.000 of the emergency fund and \$14,500,000 of regular Federal aid had been allotted to new projects. The Federal-aid roads under construction, aggregating a little over 8,800 miles at the end of January, increased to nearly 10,400 miles by the end of March. This was virtually as much as the mileage under construction by the end of July of the preceding year; and by June 30, the end of the fiscal year, construction work was in progress on nearly 16,500 miles.

Nearly \$75,000,000 of the \$80,000,000 emergency appropriation had been allotted to projects by May 31; and by August 31, the limiting date set by Congress, virtually the whole amount appropriated had been earned by completion of work. Until the last vouchers are received from the States the exact amount earned can not be ascertained

# Road-Construction Progress

During the fiscal year 1931 Federal-aid projects involving the improvement of 11,033 miles of road were completed. Of this mileage, 7,939 miles were initially improved; that is, the improvements completed were the first to be made with Federal aid on the particular roads involved. Advanced stages of construction, adding a further degree of betterment to roads previously improved to some extent with Federal aid, were completed on 3,082 miles; and 12 miles built a number of years ago with Federal assistance were reconstructed.

The total mileage improved with Federal aid to date and classified as completed, excluding 4,174 miles which was undergoing stage construction or reconstruction at the end of the fiscal year, is 88,713 miles.

Of this completed mileage, nearly 390 miles consisted of bridges over 20 feet in span and their immediate approaches. The remainder of 88,323 miles was made up of roads variously constructed according to the requirements of traffic and the means available in each particular case. Roads totaling 36.626 miles were improved with high-type surfaces of bituminous macadam, bituminous concrete, Portland-cement concrete, and vitrified brick and other block pavements. These are types of improvement suitable for the most heavily traveled roads.

Roads of intermediate traffic density, totaling 4,529 miles, were improved with macadam, various low-cost bituminous mixtures, and bituminous-treated gravel surfaces. On 35,920 miles of less heavily traveled roads, surfaces of gravel without bituminous treatment and sand-clay and topsoil surfaces were laid, and 11,248 miles were improved merely by grading and draining. All of the last class of improvements are approved upon the definite understanding that surfaces adequate to meet traffic requirements will be laid as promptly as possible. The roads thus improved and those on which low-type surfaces have been built are the sections of the system upon which subsequent stage-construction operations will be conducted.

#### Work in Progress at End of Fiscal Year

At the close of the fiscal year work was in progress on 16,481 miles of road. On 12,306 miles the work under way was the first work to be done with Federal aid; on 4,139 miles the work consisted of an advanced stage of construction added to an improvement previously made with Federal aid; and on 36 miles the work was reconstruction.

The 11,033 miles completed during the fiscal year were built at a total cost of \$255,088,414.09, toward which the Federal Government contributed \$105,918,451.14 and the States the balance. Not all of the Federal contribution to these roads was paid during the past year. Payments were made for work done upon them throughout practically the entire period of their construction, which on many projects considerably exceeded a year.

But the payments actually made to the States during the year on these completed projects and others still under construction exceeded the amount involved in the completed projects and reached the total of \$133,340,910.64. This is the largest sum of Federal-aid money ever paid to the States in a single year. It exceeds by nearly \$12,000,000

the recently increased apportionment of \$121,875,000.

This heavy disbursement, made possible by the existence of a relatively small unexpended balance from previous fiscal years, is another indication of the extent to which the Federal-aid program has been enlarged in the effort to furnish additional employment. So high a rate of expenditure can not be long continued, however, because the expenditures must be kept within the amount apportioned when all accumulated balances have been exhausted.

# Forest Highways

In the national forests improvements were completed on 281 miles of the forest-highway system, bringing the total improved to date to 4,638 miles. The forest highways are the most heavily traveled of the roads traversing the forest areas. They comprise a system, which has been designated in cooperation with State highway officials, aggregating 15,024 miles. Of this mileage, 8,787 miles consist of roads which are necessary sections or extensions of the Federal-aid system, and 6,237

miles serve communities within the forests.

For this work also the appropriation authorized for the fiscal year 1931 was increased. For all road work in the forests in 1930 the authorization was \$7,500,000. Of this sum, \$3,000,000 was reserved for the improvement of roads and trails needed for the administration and protection of the forests themselves, and the balance of \$4,500,000 was available for the roads more extensively used by the public. For 1931 the whole authorization was increased to \$12,500,000 and the amount for forest highways to \$9,500,000, the sum reserved for trails remaining \$3,000,000. The act of December 20, 1930, also carried an appropriation of \$3,000,000 to further increase employment on forest-highway work.

As a result of these increased appropriations the forest-highway construction program has been rapidly expanded. The entire amount of the emergency appropriation was obligated by June 30, and there was placed under construction a mileage of projects to be financed with the other available funds exceeding the corresponding mileage in the preceding year by 75 per cent.

The difficulties of location and construction and the short working season entailed by the altitude and isolation of many of the forests have prevented as rapid an expansion of the construction program as was possible in the case of Federal-aid roads; but considering these circum-

stances, the progress made in this work is very substantial.

# NEW CONTACTS WITH FRUIT AND VEGETABLE INDUSTRIES

The passage of the perishable agricultural commodities act, signed June 10, 1930, opened to the department a new field of usefulness to the growers and handlers of fresh fruits and vegetables. This act is designed to suppress unfair and fraudulent practices, to prohibit fraudulent charges, unjustifiable rejections or failures to deliver, and to prevent the discarding or dumping of consigned products without reasonable cause. As a means to this end, handlers of fresh fruits and vegetables moving in interstate or foreign commerce in carload quantities were required to obtain licenses from this department. Violations of the act may be punished by the suspension or revocation of licenses or by publication of the facts. Redress for parties injured by violations of the act may be secured through reparation orders issued by this department after the determination of the facts by investigation and public hearing.

By the close of the fiscal year, 15,180 licenses had been issued. Approximately 1,500 requests were received for the investigation of disputes. Of these, more than 800 were satisfactorily closed. Action by the department's solicitor was invoked in 102 cases; the remainder are pending. Under an earlier enactment, the produce agency act, 296 complaints were received and 217 closed. Thirteen cases went to trial in the United States courts, all of which resulted in convictions.

In the informal handling of many hundreds of cases the department has been able to strengthen the position of that large element in the fruit and vegetable trade which has been striving for many years to improve the business ethics of the industry.

#### AGRICULTURAL ENGINEERING

Full realization of the possibilities of machinery in agriculture calls for the removal of impediments to machine operation, and in fact for all such modifications of the physical aspects of farms as are necessary to promote economical and scientific management. This is a problem in agricultural engineering. It is being studied, with related problems, by the Bureau of Agricultural Engineering. This bureau, authorized by the last Congress, began its existence on July 1, 1931. It is new, however, only in being a separate bureau. Agricultural engineering work in the department goes back to 1898, when Congress first appropriated money for "irrigation information." Provision was later made for the study of drainage problems. In 1915 the scope of agricultural-engineering research in the department was widened to include a study of farm machinery and farm buildings. Originally the work was divided among different bureaus. In 1925 it was consolidated in the Division of Agricultural Engineering in the Bureau of Public Roads, and reached proportions that suggested the advisa-

bility of intrusting it to a distinct bureau.

Sound engineering is indispensable to the economical use of land. This is as true for the small farm as for the large. In fact, the immediate task of the Bureau of Agricultural Engineering is to promote the welfare of our six and a quarter million small-farm operators. It will strive specially to serve the needs of the family farm, particularly in such matters as the construction of farm buildings, the proper choice of farm machinery, the improvement of farm water supplies and farm sanitation, the control of insects and plant diseases by mechanical means, the preservation of farm products by refrigeration, and the prevention of soil erosion. Three problems are outstanding in connection with farm buildings—the need of remodeling farm homes; the improvement of livestock barns, particularly dairy barns; and the provision of more and better farm storage. In connection with farm machinery, considerable work to supplement progress already made is necessary in the mechanical control of the European corn borer and in the more efficient mechanical distribution of fertilizers. Studies in irrigation will be broadened. In irrigation studies the big problem is the conservation of water, rather than the irrigation of additional land. Agricultural engineering may help to prevent soil erosion by developing better terracing methods, and also by indicating desirable changes in machinery designed for use on terraced fields. Improved engineering practices can materially reduce farm costs of production.

#### ANIMAL-INDUSTRY INVESTIGATIONS

The livestock industry continues to be a valuable balance wheel to agriculture, especially in utilizing crops produced in excess of human requirements. Though low prices have prevailed for food animals this year, stock raising is essentially in a sound and stable condition. Losses from diseases, parasites, and other causes are being steadily reduced, and research dealing with the economy of production is giving new information of public interest and practical value.

Beef-cattle range studies, conducted during the year in cooperation with State experiment stations, showed that materially larger calf crop are obtained from pasture breeding than when the cows are bred on

open range or forest reserves. The number of calves alive at weaning time was from 7 to 11 per cent greater in the case of the pasture-bred lots.

Attention was given to beef-cattle production and meat utilization in southern areas recently released from the cattle-tick quarantine. As a result, increased numbers of cattle were fattened on grain, and the production of higher quality meat rose in many localities. The work resulted in a greater production of feed crops suitable for beef production. Also the number of purebred beef bulls used in the area increased.

Experiments in lamb production again demonstrated the advantage of giving ewes extra feed at breeding time, a practice known as flushing. For this purpose good pasture proved superior to all other feeds. Ewes flushed on extra-good pasture produced 164 lambs per hundred ewes. Those fed grain produced 152 lambs per hundred ewes. Those not given any extra feed at breeding time produced only 143 lambs per hundred ewes.

It has long been customary to feed market hogs all they will eat, to bring them to desired market weights as quickly as possible. In recent investigations, however, limited feeding resulted in more economical pork production. Hogs fed a limited ration made less rapid gains, and required longer feeding periods. But they were more efficient in utilizing their ration and required much less feed per hundred pounds of gain than did those fed a full ration. Moreover, limited feeding produced somewhat leaner carcasses, an advantage since the taste of the American consumer is gradually turning toward leaner pork. These results offer the producer additional means of reducing pork-production costs when market conditions are favorable to a longer feeding period.

Swine-breeding investigations showed, contrary to the general opinion, that crossbreds are not always superior to purebreds in vigor and gains. It was found also that fertility and low mortality were more important factors in economical swine production than minor differ-

ences in type and rate of gain.

Meat investigations, conducted by 3 department bureaus cooperatively with 22 experiment stations, continued to throw new light on the factors which make meat tender, palatable, and otherwise desirable from the consumers' standpoint. These results suggested carefully planned performance studies, which were begun during the year, to identify and improve superior strains of meat animals within a breed. Consideration is being given not only to production efficiency, but to carcass yields and quality of meat produced.

Much attention was given to means of increasing the hatchability of hens' eggs. The results obtained were superior to those of previous years, in part because the breeding stock had been selected on the basis of hatchability. A study of the effect of egg production on hatchability showed that a large production of eggs during the breeding season

is apparently conducive to good hatchability.

#### Bovine-Tuberculosis Eradication

The extensive Federal-State task of eradicating tuberculosis from livestock is steadily progressing. The degree of infection among cattle was more than 4 per cent at the beginning of the campaign 13 years ago. The corresponding figure for 1931 was only 1.5 per cent. More than 13,000,000 cattle were tested during the last fiscal year, out of

which number 203,778 proved to be tuberculous as indicated by their reaction to the tuberculin test. The elimination of these animals

removed a menace to the public and to the livestock industry.

The method of area testing by which all the cattle in a given unit, generally a county, are tested within a short time again proved effective and economical. At the end of the fiscal year 1,223 counties (and 50 towns in Vermont) had completed one or more tests of all cattle within their borders, and had been officially designated as modified accredited areas. This term signified that bovine tuberculosis has been reduced to one-half of 1 per cent or less and that all reacting cattle have been removed. Four entire States—North Carolina, Maine, Michigan, and Indiana—have been freed of bovine tuberculosis by the area method.

Records of Federal meat inspection indicated further reduction in the number of cattle and hogs condemned as unfit for food because of tuberculosis. This reduction reflected important savings to livestock producers through reduced infection on farms. The benefit will continue, provided owners cooperate with livestock sanitary authorities

in preventing reinfection.

The present time is opportune for tuberculosis-eradication work even in highly infected areas. Dairy cattle can be obtained at moderate cost for replacement purposes. Hence the removal of reactors from herds is cheaper than during times of higher prices for cattle and cattle products. Moreover, the indemnity paid and the salvage value received reduce the loss to a low figure in proportion to the benefits of having healthy herds. The average combined Federal and State indemnity paid last year was approximately \$65. In addition owners received a salvage value of about \$25 for the average reactor.

The demand for tuberculin testing in most States continued to exceed the facilities for meeting it, and waiting lists were necessary. Sporadic opposition decreased, largely because of a better understanding of the benefits of eradicating boyine tuberculosis. Court decisions favored the continuance of testing where the authority to do the work

or the accuracy of the tests had been questioned.

# Tuberculosis of Poultry and Swine

The elimination of tuberculosis from poultry and swine also received added attention, and plans were made for active eradication work in the more seriously infected areas Farmers in some States have received 2 cents a pound less for their poultry because of the presence of the disease in a large number of fowls marketed Such losses stimulate interest in the eradication work. Hogs are commonly slaughtered so young that tuberculous lesions are rarely extensive. There is nevertheless a heavy loss owing to the condemnation of hog carcasses and parts, and to the special handling that infected hog carcasses must receive in federally inspected slaughtering establishments. Hogs contract tuberculosis from both cattle and poultry. Hence the suppression of the disease in cattle and poultry is essential to its elimination from hogs. Meanwhile, losses can be reduced by methods of feeding and management that protect cattle, hogs, and poultry from sources of infection. The continued cooperation of livestock owners and the public is earnestly being sought to the end that progress in eradicating this disease may be still further hastened.

#### Animal Parasites Yield to Science

Of 15 Southern States formerly infected with the cattle-fever tick, only 4—Arkansas, Florida. Louisiana, and Texas—still have quarantined areas. Instead of constituting one solid block, as formerly, the tick-infested region has now been split up into three separate parts bounded by free areas in which sentiment is favorable for an early

completion of the entire eradication program.

The department is combating other parasites that hamper stock raising. On the Pacific coast liver-fluke control work, begun on a small scale three years ago, has been extended in California and introduced into sections of Oregon, Nevada, and Arizona. Before the work began ranchers in California suffered severe losses, and sheep raising practically ceased in several areas. Demonstrations by department workers encouraged stock owners to use the system advised for controlling liver-fluke disease, which consists in the destruction of snails on pastures by the application of copper sulphate, and the medicinal treatment of affected animals. Losses were rapidly checked. Where the recommendations were strictly followed, the disease disappeared. Sheep raising was made a dependable enterprise, and sheep a stable security for bank loans. Liver-fluke control has resulted also in material savings in feed and in a more economical production of lambs.

In the Middle West the department's system of preventing the infestation of hogs with roundworms and other parasites has been widely used. Reports show that success in producing hogs varies almost directly with the degree of attention given to sanitation. The cost of swine production was reduced in some instances by approximately one-

third.

The program of combating parasitic diseases in livestock and poultry is directed largely along two lines: Research on the life cycles of parasites as a basis for control and preventive measures, and the investigations of remedies. These investigations have revealed essential facts concerning numerous other important parasites, such as kidney worms, nodular worms, and lungworms of swine, and various species of roundworms and tapeworms of poultry. Practically all the remedies used for combating the external and internal parasites of livestock in the United States and abroad have been either discovered or standardized by investigators in this department.

# Livestock Regulatory Work Constructive

Though certain forms of Federal regulation are accepted by producers and the public as a necessary protection, a better understanding of this branch of the department's work is highly desirable. Greater knowledge of it should help to prevent both inadvertent and wilful violations. Compliance, in turn, increases the effectiveness of the work which has proved to be highly constructive in its effect on the industry.

In administering the packers and stockyards act, the Secretary of Agriculture has supervision over various practices and conditions, including commission rates and yardage charges. When investigation indicates such marketing costs to be unreasonable, he may order changes. Recent department orders, affecting yardage charges at two markets and commission rates at a third, are estimated to save shippers approximately \$345,000 a year. The settlement of disputes and complaints regarding the quality and weight of feed, alleged shortages, and

the "switching" of animals receive attention. The testing and maintenance of scales for weighing livestock at designated markets are under supervision, and many improvements in the installation of scales have been made. At the close of the year 91 stockyards were "posted" as coming within the jurisdiction of the packers and stock-

vards act.

Federal meat inspection has increased public confidence in the wholesomeness of meats bearing the Federal stamp of approval. This hygienic service covers the slaughter, and conversion into meat, of about 74,000,000 animals annually. It also helps in the development of a foreign market which, in the absence of inspection, would be largely closed to meat from the United States. During the last fiscal year, 66,436 official meat-inspection certificates were issued, to cover the exportation of more than 900,000,000 pounds of meat and meat-food products. Approximately 33,000,000 pounds of meat and meatfood products offered for importation from foreign countries was inspected. Approximately 300,000 pounds, principally beef, was condemned or refused entry.

Establishments that produce vaccines, serums, and other veterinary products are licensed and inspected. The use of such products, among which anti-hog-cholera serum is the most familiar, enables stockmen to raise a greater proportion of their animals to maturity or market size. The production of clear anti-hog-cholera serum last year increased 19 per cent over that of the preceding year, the total production of all anti-hog-cholera serum increasing less than 5 per cent.

Livestock are admitted into the United States only from countries free from important livestock maladies, and then only in accordance with a system of certificates, inspection, and other means of control. Similar restrictions apply to many products such as hay, other feeding materials, hides, skins, and other articles associated with livestock. Animals shipped in interstate commerce are likewise subject to inspection, dipping, immunizing treatment, and similar safeguards. results of the year's work show the far-reaching scope of this protection. No serious foreign livestock diseases gained entrance to the United States, though more than 116,000 animals and vast quantities of products associated with livestock were imported. Several hundred animals were refused entry because of diseased or parasitic condition.

Supervision over the movement of livestock in interstate commerce included about 75,000,000 cattle, sheep, and swine of which more than a million were dipped, immunized, or otherwise treated to prevent the spread of disease in areas to which the stock were shipped. More than 22,000 stock cars were cleaned and disinfected under Federal supervision. Similar treatment was given to about 13,500 cars used

in the transportation of live poultry.

#### DAIRY RESEARCH AND SERVICE

Results of 13 years of dairy-cattle breeding research and experimental work enable the department to declare that the most certain way to develop herds with an inheritance for uniformly high production is through the continuous use of "proved sires." A meritorious proved sire is one that has demonstrated through the production records of his daughters that he transmits only a high level of production. Since a bull can not be proved without an adequate number of records of his daughters, every effort is being made to increase facilities for obtaining and compiling such records. One or the most practical ways is through dairy-herd improvement associations. With the records obtained

through these associations, good bulls can be located.

Progressive breeders, agricultural colleges, and experiment stations are proving out a few bulls each year, through the records of their own herds or by lending promising young bulls to cooperators. The Bureau of Dairy Industry compiled this year enough production records on the daughters of bulls it had placed from its experimental herds with cooperators to afford evidence of the transmitting ability of seven Holstein sires. The daughters of six of these sires produced more milk and butterfat than their dams. The increases in milk production ranged from 208 to 2,120 pounds a year, and in butterfat production from 29 to 89 pounds a year. Only one of the seven had daughters which produced less than their dams. Records of eight Jersey sires showed that the daughters of seven of them averaged from 6 to 109 pounds more butterfat production than the dams of the daughters. On the other hand, the daughters of one sire had on an average a yearly production of 21 pounds of butterfat less than their dams. Results of the provedsire method in herds at various field stations promise success from the application of this principle of breeding, whether the system used be outbreeding, line-breeding, or inbreeding.

## Methods of Manufacturing By-Products

The department further developed improved methods of manufacturing cheese, ice cream, casein, and other by-products of the dairy industry and induced many commercial plants to adopt these methods. Half of the 36,000,000 pounds of Swiss cheese consumed annually in the United States is imported. Much of the domestic market is lost to our own dairy industry because American Swiss cheese is frequently not equal in quality to the imported article. It was demonstrated some years ago that the quality of Swiss cheese depends largely on the quality of the milk used in making it, and on the control of bacterial development in the cheese during its manufacture and ripening. The "culture method" of making Swiss cheese, which was developed by the department, enabled factories to produce a higher percentage of high-quality cheese.

Recent improvements in this method promise still better results. The earlier work demonstrated that there are at least two kinds of bacteria essential to proper ripening of this type of cheese and that the quality can usually be improved by adding them to the milk in pure cultures. It was afterward found that a third starter organism is also necessary. Later investigations indicated that the most advantageous rate of growth of these bacteria, their proper numerical relation at the different stages of manufacture and ripening, and the effect of one

group on another.

It was found, for example, that certain bacteria are essential to proper eye and flavor development, but that too many cause "oversetting." The rate of growth of this culture was determined under different temperature conditions, and methods of starter making were standardized to introduce a uniform number of eye-forming bacteria into each cheese.

In the last year more than 3,000 packages of bacteria cultures were distributed to cheese factories. Because it is difficult to get these

liquid cultures to the factories at just the right time, the bureau developed a dry culture of the eye-forming bacteria. In this culture powder is standardized so that the required number of bacteria for a single cheese can be put in one package, and a supply sufficient for two

or three weeks furnished each factory.

Many cheese factories in Ohio, New York, and Wisconsin, including a number which had never before used pure cultures, cooperated in a campaign to introduce the new method into commercial production. Factories using this method have been able to control manufacturing conditions and to produce more uniformly high-grade cheese. Domestic Swiss cheese made by the culture method won first honors last year at the Ohio State Fair, at the Dairy Industries Exposition, and at the Ohio Swiss Cheese Convention.

A method of ripening Cheddar-cheese curd in the container in which the cheese is marketed has been brought to a point at which it may be commercially utilized. The curd, pressed and cut to size, is placed in a specially constructed container wherein it ripens normally without molding. There is no loss of moisture, and hence no rind is formed. The cost of canning is not excessive, and is partly offset by the elimination of shrinkage and paraffining. The department helped factories in 13 States in the South and Middle West in making Cheddar cheese. In the South, where cheese making is a comparatively new industry, specialists recommended changes in methods. As a result, many factories are turning out No. 1 quality cheese. At one factory the sales value of cheese produced increased at the rate of \$4,000 a year.

A method of making uniformly high-quality cottage cheese was demonstrated. This product is known as the low-acid rennet type of cottage cheese. When made properly it has a rich creamy appearance, low acidity, good keeping qualities, and palatability. Cottage cheese is one of the most profitable outlets for by-product skim milk at dairy

manufacturing plants, especially when it is of good quality.

#### Increased Interest in Casein

Increased tariff protection on casein has renewed the interest of domestic creameries in this product, and manufacturers sought aid in applying the new grain-curd method. Five plants in the East and one in the West adopted the method, which enables them better to meet the requirements of the paper-coating industry, the largest consumer of casein. Many western plants manufacture lactic-acid casein. Accordingly, the department this year developed a modification of the grain-curd method which can be used by any casein factory without additional equipment. If all the casein heretofore imported were to be made in this country, it would afford an outlet for about a billion pounds of skim milk annually.

By planning and taking part in educational programs, by sponsoring students' judging contests, and by giving assistance in the training of dairy inspectors, the department aided cities and communities in improving the quality of their milk supplies. Many producers followed suggestions offered to improve the quality of their milk. The program was also forwarded through 4-H dairy clubs, by milk-improvement campaigns on an area basis, and through cooperation with

the Federal Board of Vocational Education.

Demonstrations and lectures on improving the quality of milk were presented at the three Rosenwald negro extension schools at Orangeburg, S. C., Prairie View, Tex, and at Nashville, Tenn, before 303 negro extension workers. A resurvey of an important milk-supply area in Maine, where a milk-quality campaign had been conducted the previous year, showed marked improvement in the quality of the milk coming into shipping stations; 57 per cent of the patrons delivered grade 1 milk after the educational campaign, whereas in the year previous the percentage had been only 39 8. Conferences between officers of the United States Public Health Service and department specialists resulted in an agreement to promulgate a milk ordinance embodying recommendations of the two organizations, to serve as a guide to States, municipalities, and communities, in the sanitary regulation of local milk supplies.

#### PLANT INDUSTRY DEVELOPMENTS

Scientific discoveries and methods of cultivation that reduce costs of production on the farm have perhaps more value in periods of agricultural depression than at any other time. They are a sure means of increasing profits or, at any rate, of reducing losses. More efficient production need not be production in greater volume. Research that leads to increased yields per acre, to increased production of meat and milk per unit of feed consumed, or to improvements in the quality of farm products, though not the sole thing necessary to a profitable agriculture, is nevertheless indispensable.

Some notable contributions were m. de by the Bureau of Plant Industry to farm technology. This unit in the department has developed and promoted the use of better crop varieties, effected improvements in plant-disease control, and cooperated successfully with other agencies, public and private, in devising means for reducing spoilage

in the transportation and storage of farm products.

# Improved Varieties of Cotton

Special attention was given to the production of better qualities of cotton. Plant-breeding studies and variety tests have demonstrated that improved varieties which produce longer and more uniform fibers outvield the shorter staple varieties in some localities. These results indicate that the shorter staple varieties in the United States, which produce cotton that comes into direct competition in foreign markets with the short-staple cotton of India and China, could be replaced by longer staple varieties throughout much of the Cotton Belt with little or no sacrifice in yields. Accordingly the department is conducting an educational campaign to encourage the planting of the improved varicties that plant science has developed. It is emphasizing the need for larger quantities of strong and uniform fibers in the automobile industry and in the production of airplanes, balloons, dirigibles, and parachutes. It is stressing also the increasing demand for fine cotton fabrics in clothing. As a first step for regional improvement in cotton production, the need of "single-variety" cotton communities is being urged. This recommendation rests on the necessity for adequate supplies of select seed year after year. Seed can not be maintained varietally pure unless steps are taken to prevent its admixture with other varieties through cross-pollination in the field, as well as through the mixing of the seed in the cotton gin. A means of keeping the seed stock pure is to limit the production in each community to one variety.

## New Varieties of Vegetables

Exceptionally good results were obtained in tests of new tomato variety. Break O' Day, which was developed by the department. This tomato is both early and wilt resistant. Break O' Day seed was released in some quantity to a large number of seedsmen all over the country. Except under conditions of abnormally high temperature, it has given unusually good results. The new tomato was received with as much enthusiasm as was the Marglobe tomato some years ago. It is nearly as early as the Earliana variety. It has a large globular red fruit somewhat similar to that of the Marglobe and yields well over a long period. These characteristics, with its resistance to wilt, make it perhaps the most important variety of early tomato introduced since the Earliana.

The department also released for extensive cooperative tests a potato variety called the "Katahdin." This variety is the result of many years of critical hybridization and selection in different potato regions of the United States. It was selected particularly for its resistance to mild mosaic disease. Among other good qualities it has unusual uniformity in the size and shape of the tubers and in their cooking qualities. It is high yielding, comparing favorably in this respect with Rural New Yorker and Green Mountain. It originated in 1923 as the result of a cross made in potato-breeding work. After six years of preliminary testing in Maine it was tested on a small scale in 1930 by a number of growers in widely separated sections of the country and seemed well adapted to muck and peat soils, but not to regions that have summer droughts.

## Disease-Resistant Sugar Beets

Important results were recorded in the development of sugar beets resistant to the curly-top disease, which has caused heavy losses in the Western and Intermountain States. Disease-resistant strains have been developed by selection from commercial strains, and by crossing commercial beets with the wild beet of the Mediterranean area. Resistant-hybrid beets thus developed, when planted under moderately severe curly-top conditions, outyielded fields planted with commercial beet seed in the ratio of 3 to 1. They gave satisfactory yields, except under the most severe curly-top conditions. In one of the areas most seriously attacked by the curly-top disease a resistant strain provisionally called "Factory No. 1" outyielded a commercial strain by 4.3 tons of beets and 1,195 pounds of sugar per acre. In several places an increase of seed was obtained from this outstanding strain. Seed stocks from beets resistant to curly top are being increased as rapidly as possible, so that these improved strains may be introduced into commercial use.

Study of orchard-spraying problems resulted in slight, though important, modifications of technic in the handling of spraying materials under different conditions. Valuable information was obtained as to the handling of spray materials on different plant varieties and under different weather and cultural conditions. Considerable experimentatation was done with new spraying materials. A public-service patent was taken out on a zinc-lime spray which is used to control bacterial leaf spot on peach foliage. This spray controls leaf spot without injury to the leaf; in fact it seems to stimulate the foliage. It was used with

arsen ite of lead in two applications without doing any harm to the trees, and was also used without causing damage in combination with colloidal sulphur and arsenate of lead. Trees sprayed a dozen times, with the recommended strength of this spray, with two of the applications containing arsenate of lead, were not only uninjured but at the end of the season were the best-looking trees in the orchard in which the tests were made.

#### Control of Plant Diseases

Investigations completed late in 1930 showed threatening developments in the white-pine blister rust situation. A rapid and devastating spread of this disease was discovered in the commercial areas of western white pine in northern Idaho and in adjacent portions of Washington and Montana. White-pine stands over extensive areas will suffer maximum damage by the rust during the next 10 or 15 years unless the disease is controlled. Control is possible only by the systematic eradication or suppression, in or near pine stands, of currant and gooseberry plants (Ribes). This is a more difficult and costly task in the Western than in the Eastern States. Many of the pine areas are difficult to reach with labor and supplies; wild currant and gooseberry bushes are abundant; control measures must be concentrated within a short period each season; and mixed ownership of large tracts of wild lands makes control operations difficult. Control is nevertheless possible, provided effective methods are systematically applied on an adequate scale.

Distinct progress has been made in the control of stem rust of wheat through barberry eradication since 1918, when this campaign was started. In the 5-year period 1916-1920 the average annual loss to wheat caused by this rust, aside from its effect on the quality of the grain, was estimated at 57,000,000 bushels. In the 5-year period 1926–1930 the loss attributed to this disease was estimated at less than 10,000,000 bushels. In the interim millions of barberry bushes were All told, more than 18,000,000 barberry bushes susceptible destroyed. to rust have been destroyed in the 13 States of Colorado, Illinois, Indiana, Iowa, Michigan, Minnesota, Montana, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin, and Wyoming. Recent research has indicated that different strains of stem rust, when growing on the leaves of the common barberry, may actually cross and produce new strains which may infect grain bred for resistance to the parent rust forms. Hence the barberry bush, besides carrying considerable quantities of stem rust over the winter in the spring-wheat areas, may also serve as a special breeding ground for new and dangerous forms of the disease.

## Refrigeration of Perishables

For a number of years experimental studies have been made on the reaction of perishable fruits and vegetables to the temperature and other environmental conditions encountered during transportation and storage. The primary object has been to improve existing handling practices with a view to increasing the shipping radius and lengthening the period during which the products may be distributed to consumers in sound, wholesome, and attractive condition, with minimum risk of deterioration and at minimum cost.

emphasized. Adequate steps, however, were not taken. Effective controls are possible chiefly against the "egg beds" and against the newly hatched hoppers. After the insects have reached practically full growth and are becoming winged, control becomes difficult or impracticable. The eggs can be destroyed by cultivating areas where the grasshoppers have collected for oviposition. The young insects can be controlled even more effectively by the use of poisoned bran baits as they emerge from egg-laying areas, or during their migration to small-grain and forage fields and later to corn.

The damage, though exaggerated in many reports, was so serious in its worst phases as to arouse general interest, and many demands were received for Federal aid for the poisoning of these hungry hordes of insects which threatened the destruction of thousands of acres of crops in the Great Plains area of the west. Unfortunately the department had no funds available for the purchase of poisons or for labor. All that could be done was to cooperate with State and local agencies in

directing practicable control measures.

Abundance of hoppers and prospective damage were indicated early in May when hatching began over the areas of egg deposition, in some of which the eggs had been placed in the sod at the rate of 10,000 to the square foot. Over most of the area, before any important action was taken by the States concerned, the most effective period for control had passed. Some benefit would still have been possible had an adequate supply of poisoned bait, and means for its application, been available. In South Dakota, where operations were begun early in June, the commercial bait mixture used—24 carloads of which were distributed—contained poison at only half the required rate. The use of this bait was naturally disappointing. Toward the end of June a much better bait, prepared commercially under the proper formula, became available and gave excellent results. By this time, however, the movement of grasshoppers from small-grain and forage crops was well under way and many fields of corn had been destroyed. The distribution of poisoned bait at this time killed the insects that fed on it, but the enormous number of grasshoppers that continued to move into corn made it impossible to save the crops. It soon became evident that further large-scale poisoning for the season was a wasted effort, and a general determination was reached to conserve the funds made available by the States for use in the destruction of eggs in the winter of 1931-32, and particularly for the baiting of the young grasshoppers of next year's brood.

The outlook for 1932 can not now be definitely indicated. The situation may be more or less safeguarded by winter and spring conditions adverse to the insects. It seems desirable, however, to make preparations to prevent a repetition of this year's experience. This department will help to survey localities in which egg masses are likely to be deposited in large numbers, and to supervise the destruction of grasshopper eggs during the winter by cultivation. It will cooperate also in the more important work of poisoning the young hoppers early

next season.

### Mexican Bean Beetle

The Mexican bean beetle has now spread from the Southwestern States, where it has long been established, through the Southern, Central, and Eastern States and as far north as Canada, and continues to be the most important pest of the bean crop. Public interest in this

insect is greatly accentuated by the fact that it has made the kitchengarden culture of beans as a table vegetable very uncertain. While the control of the bean beetle in commercial plantings for the market or for canning is readily obtained by three or four applications of magnesium arsenate, applied with adequate machinery and at the proper time as a spray, the similar control of the pest on garden crops is much more difficult. Not only is it difficult to have such spraying done as efficiently as to method and time, but more treatments are needed, because in such garden cultures the picking is extended over the longest possible period, whereas in commercial cultures it concerns usually only a few pickings over a much shorter period. Control is also possible with pyrethrum extracts. These materials are particularly useful on small garden plantings when it is necessary to apply a remedy after the crop has reached the bearing stage, since pyrethrum is nonpoisonous to man in the dilutions used to control the beetle

The effect on the bean beetle of the long drought and high temperatures of 1930 was to reduce the winter carry-over of this pest. Damage from it during the current season was much reduced. No permanent natural control of the bean beetle by parasites has been developed in this country. Attempts have been made to introduce a parasite from Mexico, but it has proved difficult to carry the insect over the winter. In the winter of 1930-31, however, a large number of parasites were bred in a greenhouse and liberated. The establishment of this beneficial insect should help to reduce the bean-beetle menace.

# Japanese Beetle

The Japanese beetle is becoming less abundant in the sections reached first in its spread from where it was introduced in New Jersey. This is partly a result of natural controls—diseases and parasitic insects—such as normally come, although often slowly, in the case of most introduced pests. Some of the decrease, however, may be credited to the importation from Asia of foreign parasites of the beetle. This work has established considerable numbers of certain enemies of the beetle and its grub in the invaded area.

Artificial control, through baits and insecticides, is becoming more effective. The beetle, however, is very resistant to poisons, and the grubs must be reached by difficult soil treatments. A new phase of control has been developed this year in the application of a dust to sweet corn at the beginning of the "silking" stage. This protects the silk from attacks of the beetle, and thus safeguards the growing crop. Another recent development has been the successful application of acid-lead arsenate to soil in nursey plantings and to lawns for the destruction of the grubs—a required condition in the shipment of nursery stock under the Japanese-beetle quarantine.

# Mediterranean Fruit Fly

Research work on the Mediterranean fruit fly has been concluded in Florida but is being pushed in Hawaii. In Florida investigations initiated in the eradication effort of 1929 were completed. The results will help in the control of the pest should it again get a foothold in the United States. Important studies deal with the action, harmful or otherwise, of amenic, copper, and other bait sprays on citrus and other fruit trees, and with the cultivated and wild fruits of Florida which are

possible hosts of the fly. A study has been completed also of certain native fruit flies which occur in Florida. This assembles much information which will facilitate the determination of any suspected maggots in fruit, and their easy separation from the dreaded Mediterranean species. Studies of the insect itself and its control in relation to its various host fruits have been conducted in Hawaii since the end of 1929. The University of Hawaii built specially designed laboratories and offices for the department's workers, and set aside land for experimental plantings. Closely related is a study of the native fruit flies of Mexico, in which the Mexican Department of Agriculture cooperated.

### A New Pest of Stored Tobacco

A serious type of insect injury to stored leaf tobacco developed during the year. It was caused by the larvae of a cosmopolitan moth, Ephestia elutella, which hitherto has not been at all abundant or even destructive in the United States, and in this and other countries has confined itself largely to stored vegetable foods. In such associations it has been several times reported in the United States. Early in August, 1930, it was found to be heavily infesting stored leaf tobacco in an isolated area in the bright-tobacco belt. Thousands of moths were flying about in the warchouses, and the feeding of the larvae had extended 3 or 4 inches into the tobacco as stored in hogsheads.

Following the report of this injury, a thorough investigation was made which indicated that the infestation was confined to five warehouses. Some 31,000,000 pounds of leaf to bacco valued at \$10,500,000 were involved, infestation being heaviest in the more valuable grades. The warehouses containing this to bacco were given drastic fumigation in August of last year and a second and even heavier fumigation in June of this year. These fumigations largely eliminated the pest. The moth must, however, be reckoned with as a future potential pest

of leaf tobacco.

### Arsenic-Residue Problem

In the last 50 years various arsenical insecticides have become standard for the control of many fruit and vegetable pests. A result is the arsenic-residue problem, the urgency of which increases with the wider use of arsenicals, and with the enforcement of restrictions as to arsenic tolerance in products both for domestic use and for export. In fruits this situation is met by washing them either in diluted acid or alkali, but the problem can not be considered solved until a remedy is found that will control the codling moth, the Mexican bean beetle, and simi-

lar pests, and will not leave an objectionable residue.

In the case of the codling moth, hope is now seen in certain fluorine compounds. Two—barium fluosilicate and cryolite—gave satisfactory results in field tests conducted in the Pacific Northwest in 1930 and again this year. These compounds and others have proved inadequate for the control of the codling moth in humid sections, but the results obtained in comparatively dry regions suggest the possibility of adapting them to other climates. Another alternative for arsenicals is the use of a mixture of nicotine sulphate in a dilute white-oil emulsion—a combination which has given fairly good results when used against the apple worm in the Northwest, but has again been less satisfactory elsewhere.

### Black Flv

This department and the Cuban Department of Agriculture completed this year a cooperative project looking to the control of the black fly, a pest attacking the leaves of trees and not the fruit. It is the most important enemy of citrus trees in Cuba and other islands of the West Indies and in Central America. The risk to the Florida citrus crop is obvious. The original home of the black fly was believed to be in southeastern Asia, and it was known that natural parasites of this post occurred there which, if imported, might accomplish effective control. The Cuban authorities offered to make this attempt and to assume the operating costs of the undertaking if the department would supply technical personnel. This was done with notable success. Several different types of minute wasp parasites were introduced. One of these, Eretmocerus serius, multiplied to an extent that permitted liberations throughout Cuba, and also the establishment of colonies in the Canal Zone and Haiti. For Cuba the black-fly menace is now looked upon as fully controlled. All groves in which colonies of the parasites were established prior to October, 1930, are now commercially free from the fly. A number of coccinellid beetles were also introduced. One of these has proved able to do effective work, though not with the certainty of the parasite Eretmocerus serius. A sympathetic attitude toward the collection and importation of insect parasites has developed throughout the world. The United States has benefited, and has extended benefits to other countries. For example, the department this year, in response to a request from the Government of Spain, transmitted to that country a considerable shipment of an important parasite of the Mediterreanan fruit fly, long since established in Hawaii but not occurring in Spain. This shipment reached its destination and is being successfully propagated there.

# PLANT QUARANTINES

The work of the department in the cradication of the Mediterranean fruit fly in Florida was so successful that on November 15, 1930, all the restrictions on the movement of Florida products on account of this insect were removed. The last infestation was found in a doorward in St. Augustine, Fla., on July 25, 1930. Suspension of field inspection was necessitated by lack of funds from March 27, 1930, to June 13, 1930. Funds were made available on the latter date, and inspection was resumed. This work was done by from 220 to 750 inspectors until March 31, 1931, when it was discontinued. The quarantine maintained in Florida from May 1, 1929, to November 15, 1930, prevented the spread of the insect to other States. Moreover, it assured open markets for Florida's products. States receiving these products accepted them with reasonable certainty that their fruit and vegetable industries were not jeopardized.

Similar results attended the enforcement of other quarantines by the department. A notable illustration is the Japanese-beetle quarantine. Products within the infested area are inspected by the department and certificates are issued which, so far as Japanese beetle is concerned, carry the plants to their destination and insure their acceptance. Experiments conducted during the year made it possible to modify the Japanese-beetle quarantine restrictions on products moving out of the

infested area in such a way at to permit greater freedom in shipping them. Nurserymen and others affected cooperated willingly with the department in endeavoring to retard the spread of this insect.

# Gipsy-Moth Control Work

Quarantine and eradication work accomplished the apparent extermination of the gipsy moth in a large area in the State of New Jersey. In 1921 more than three million egg clusters were found in an area of approximately 400 square miles. Eradication measures were undertaken in cooperation with the State Department of Agriculture of New Jersey. No gipsy moth, in any stage, has been found in this area since

May, 1929.

The gipsy moth has been abundant in New England since 1889. For years its westward spread was gradual but steady. Eight years ago the department, with the cooperation of the New England States and the State of New York, established a barrier zone about 30 miles wide extending from the Canadian line to Long Island Sound. This zone is in the eastern part of New York State and the western parts of Massachusetts, Connecticut, and Vermont. Inspections are made by the department and by the State of New York, and any infestations found are exterminated. So far as is known no infestation has become established west of the barrier zone.

### Pink Bollworm of Cotton

The pink bollworm of cotton, which is established only in comparatively small areas in the southwestern section of the United States, constitutes a serious threat. Eradication is undertaken where it seems practicable, and efforts are made in all infested areas toward preventing the spread of the pest to the main cotton-producing regions. The first necessity is the determination of the infested areas. Remarkable progress has been made in this work through the development of machines which separate any pink bollworms which may be present in gin trash. Each machine does the work of many men, and does it better. These machines, supplemented by the gathering and inspection at a central point of representative samples of cotton bolls throughout the Cotton Belt, made possible in the 1930–31 season, for the first time, a fairly comprehensive analysis of insect conditions in the main Cotton Belt. No pink bollworm infestation was discovered in the main cotton-growing areas.

Tests conducted in the fumigation and compression of baled cotton lint permitted the removal of certain fumigation requirements in areas known to be lightly infested by the pink bollworm. This modification of the quarantine saved many thousands of dollars to cotton producers, without increasing the risk of spreading the insect to areas not now

infested.

Maintenance of the European corn-borer quarantine prevented this insect from reaching the main corn-producing regions of the United States and afforded more time for perfecting control operations.

Inspection forces at the ports of entry in the United States have been substantially increased. This not only gives better protection against the importation of injurious pests but permits the entry, under proper supervision, of larger numbers of plants which can safely be admitted.

### CHEMISTRY AND SOIL RESEARCH

Investigations in the Bureau of Chemistry and Soils brought some significant results in the protection of foods and other farm products against various destructive influences, in the utilization of farm by-products, in soil conservation, and in the adaptation of fertilizers to particular soil requirements. Further progress was made in the development of important new insecticides. Specialists in the bureau cooperated with farmers and manufacturers in developing practical applications for recent chemical discoveries, and also in experiments undertaken to test, on a commercial scale, some of the more promising

laboratory results.

Losses from the spontaneous heating of hay are not confined to the burning of barns and other farm property. Damage of this sort, though estimated to exceed \$20,000,000 annually, is multiplied many times by the loss that results from the decrease in weight and nutritive value of hay which occurs during spontaneous heating. This country's hay crop has an estimated average annual value of about \$1,300,000,000. At least a tenth of our harvested grass crop is destroyed by spontaneous heating. Experiments conducted with experimental barns and other equipment have thrown new light on the spontaneous heating and combustion of hay. It is now believed that hay bacteria, in the parts of the haymow from which air is excluded, produce unstable compounds that undergo rapid oxidation when air is accidentally admitted with a development of heat rapid enough under certain conditions to set fire to the hay. If this proves to be the case, an important step will have been taken toward the discovery of practical means of reducing losses from spontaneous heating.

Experiments conducted over a period of eight years resulted recently in proof that leather absorbs sulphurous and sulphuric acids from the gaseous pollutions of the atmosphere. This is one cause and perhaps the primary cause of the relatively rapid rotting and short life of many leather goods, such as harnesses, bookbindings, upholstery, and bags. Paper also, experiments showed, may be damaged by the absorption of gases from the air. Accordingly, research is being directed toward the discovery of types of leather and paper that can withstand this deteriorating influence. Efforts are being made also to develop, for leather,

protective dressings or treatments.

# Fumigants and Insecticides

In experiments with new fumigants and insecticides extremely promising results were recorded. Ethylene oxide, a fumigant discovered by the department in 1927, is made more effective when mixed with carbon dioxide, and also is free from fire or explosion hazard. This fumigant is used in the fumigation of grain, foodstuffs, and other commodities. Following a hearing before the examiner of interferences of the United States Patent Office, in which the priority of the department in the use of ethylene oxide as a fumigant was upheld against the claims of certain German inventors, a public-service patent for the discovery was issued to two members of the department. Thus the fumigant was made available to all American citizens, and its wide use encouraged.

The department recently developed a synthetic organic compound which is more toxic than nicotine when sprayed upon aphids. Nicotine, one of the most valuable insecticides used by orchardists, truck-

crop growers, nurserymen, and florists, is not available in sufficient supply. The new synthetic substitute is called neonicotine. One of the largest manufacturers of coal-tar products is making an insecticide which contains neonicotine as its active ingredient. A common Russian weed, Anabasis aphylla, was recently found to contain as much as 2 per cent neonicotine and related alkaloids. Efforts are being made to introduce the cultivation of this plant into the United States.

### Utilization of By-Products

Chemical research is steadily accumulating knowledge useful in the utilization of agricultural by-products. Sugarcane bagasse, a material formerly produced in amounts smaller than those required by the insulation-board industry, is now, as a result of the introduction of mosaic-resistant varieties of sugarcane in Louisiana, produced in excess of the demand. Studies showed methods whereby bagasse may be made a source of cellulose equal to any now available, except that manufactured from cotton linters. Cellulose from bagasse, it is hoped will find an application in the rayon and the nitrocellulose industrics. Several new compounds were obtained this year from lignin, a substance present in the straw, stalks, hulls, and other cellular residues of leading crops. Some of these new compounds seem likely to be useful in the pharmaceutical and chemical industries. Lignin has possibilities also in the production of synthetic resins, dyestuffs, and tanning materials.

Means have been developed for the production of fine-quality starch from sweetpotatoes of any variety, regardless of whether or not they have been stored. This discovery has promising economic possibilities, because the percentage of culls in the sweetpotato crop is large At present cull sweetpotatoes are either wasted or inadequately utilized. In a vegetable crop second in importance only to the potato crop, a cull problem of this magnitude obviously demands a remedy. From 10 to 20 per cent of the sweetpotato crop consists of oversize or undersize sweetpotatoes that must be classed as culls owing to the stringency of market grades. Sweetpotato starch has properties generally similar to those of potato starch, a commodity imported into

this country in large amounts.

Industrial uses may be found for the wavy coating of apples. Research recently showed that this coating consists principally of a paraffin hydrocarbon, a solid alcohol, and a hydroxy acid known as utsolic acid. A commercial research laboratory experimented with these materials, and reported that they might be commercially valuable, particularly in retarding the drying and in improving the gloss and water resistance of cellulose lacquers. Crude ursolic acid may find a commercial application as a waterproofing material. The sodium salt of ursolic acid acts as an emulsifier of water in oils. The paraffin hydrocarbon has properties that suggest its use in paint and varnish removers. It has been estimated that nearly half a million pounds of each of the principal constituents above mentioned could be recovered from the residues obtained in the canning of apples, in cider and vinegar making, and in the dehydration of apples. Many commercial firms are seeking industrial uses for these apple-surface compounds.

Research in the department and in the State experiment stations has shown that copper is an essential requirement of plants and animals. Traces of copper added to certain unproductive soils lacking copper make these soils productive. Anemia in man and in animals may often be corrected by the use of foods containing copper. Experiment station workers discovered that the so-called salt sickness of cattle in certain parts of Florida results from a deficiency of copper in their forage and other foods.

# Progress of Soil Surveys

In the last fiscal year the department completed a detailed mapping and description of 28,530 square miles of soils in 30 States and in Porto Rico and the Virgin Islands. In addition it made reconnaissance surveys of 10,014 square miles in Minnesota, Montana, Oklahoma, and Vermont. This work brought the entire area mapped and described since the soil survey was begun to 1,449,792 square miles, or 927,866,880 acres. Knowledge gained in soil surveys is the basis of some important recent agricultural developments. In Georgia, for example, soil surveys located and ascertained the quality of certain soil types adapted to tobacco. Trials were made, the tobacco crops succeeded, and tobacco growing developed within a few years from a comparatively unimportant position to one in which it stands second in value among the crops produced in Georgia. By other soil surveys certain soils in the piedmont section of Georgia were found suited to alfalfa,

and this crop is now spreading there rapidly.

Soil studies often indicate profitable fertilizer practice. A good example is the growing practice of applying small amounts of phosphatic fertilizer to sugar beets. This practice, the economy of which was determined by soil specialists in the Bureau of Chemistry and Soils, increases yields about 3 tons of sugar beets per acre, and is widely used throughout the western beet-growing territory. This pioneer work has increased the value of the sugar-beet crop in the western sugar-beet area by \$4,000,000 or \$5,000,000 annually. Beneficial results have thewase followed fertilizer experiments conducted in the principal sugarcane areas of Louisiana. In an important strawberry-growing district of North Carolina, growers lormerly used about 1,500 pounds per acre of a well-balanced fertilizer annually. They put this down in two applications, one in late summer after the berries were harvested, and the second in the following winter. Tests showed that yields may be greatly increased by applying all the fertilizer in one application late in the summer or early in the fall. This simple change, in various tests and eventually in commercial practice, produced from 400 to 500 quarts of berries per acre more than the split applications previously used. Furthermore, the berries matured earlier. Strawberry growers in the Chadburn district of North Carolina, by using the new method of applying fertilizer, received this season about \$75 an acre more than they would have received had they used the old method.

### Fertilizer Studies Productive

Recent experiments have shown that concentrated fortilizers are often more effective when, in addition to nitrogen, phosphorus, and potash, they contain some or all of the less common essential elements for plant growth. These include calcium, magnesium, manganese, copper, zinc, nickel, and boron. On some soils, synthetic and concentrated fertilizers of the sort commonly sold have a low efficiency, which is too marked to be the result of improper distribution or placement of the fertilizer. The trouble may be a shortage of some rare essential chemical. Manganese was found to be deficient in soils in a large area

in Florida, and in a group of soils on the Atlantic scaboard further north. By supplying this essential element, growers have netted good returns from land that was formerly unprofitable. Extensive areas formerly barren now produce a variety of truck crops for the northern

markets.

Chemical research under way has an important bearing on the fertilizer industry. The farmers of the United States in recent years have spent about \$250,000,000 annually for commercial fertilizer. So that they may get more value for this expenditure, the department conducts investigations to learn how nitrogen, phosphoric acid, potash, and other materials may be more effectively converted into fertilizers; how methods of applying fertilizers may be improved; and how sources of fertilizer materials may be developed. This last-mentioned item is particularly important because the United States is still dependent on foreign sources for no less than 80 per cent of the potash used in agriculture. American potash production is increasing, however, and now supplies annually about 100,000 tons of fertilizer salts. An important potash mine, producing water-soluble potash salt, was recently opened in New Mexico. Various potash materials exist in great quantities in various parts of the United States, and the department is studying how these may be commercially developed. Recently published results of research on blast-furnace problems are expected to have a favorable influence on the production of potash and phosphoric acid fertilizer in the United States.

# Ammonia in Superphosphates

One of the most interesting recent developments in ferfilizer manufacture is the direct use of ammonia in the treatment of superphosphates used in the manufacture of mixed fertilizers. This has certain advantages combined with disadvantages. This ammonia-treated superphosphate in fertilizer mixtures improves their mechanical condition, prevents rotting of the bags, and gives a more highly concentrated fertilizer. On the other hand, the availability of the phosphoric acid is reduced. Accordingly, the proportion of free ammonia which can be used economically in the manufacture of fertilizer mixtures is limited to about one-fourth or one-third of the maximum that could be included. Studies recently showed, however, that the use of free ammonia in fertilizer manufacture should not reduce the availability of the phosphoric acid as much as was supposed. Experiments made in this connection were confirmed at agricultural experiment stations throughout the country. Interest in this problem was so great that more than 25 research institutions participated in the tests, which showed that it should be possible to double the quantity of free ammonia used in manufacturing fertilizer mixtures without appreciably lowering the value of the phosphoric acid. Accordingly, State officials are taking steps which will permit an increase of about 100 per cent in the use of free ammonia in fertilizer manufacture. This will mean an increase of about 80,000 tons per annum in the use of synthetic ammonia. This quantity is worth at wholesale about \$8,000,000. The direct use of ammonia in fertilizer mixtures has the added advantage that it improves their drillability, and promotes a more uniform distribution in the field. Tests at State experiment stations have shown that a uniform distribution of fertilizer gives at least a 10 per cent saving.

### Soil-Erosion Problems

Erosion, which annually removes fully 500,000,000 tons of soil from the farms of the United States, is the subject of extensive investigations. Two stations for the experimental study of soil erosion were established during the last year in the States of Washington and Iowa. Six similar stations had been previously set up. These are located in Oklahoma, Kansas, Mississippi, Missouri, Texas, and North Carolina. The new stations are in the Washington-Oregon-Idaho wheat belt and the rich locsial Corn Belt soil area of the Missouri River Valley, in both of which regions erosion is a serious problem. Funds for an erosion-control and moisture-conservation program were appropriated

by Congress in 1930.

It was demonstrated during the last year that on certain moderately steep slopes, some soil types erode so rapidly that it seems impossible to utilize the land for clean-tilled crops except by strip farming, with terracing and the use of soil-saving crop rotations as well. methods, however, promise to be very effective. Subsoiling in alternate strips is also under experimentation. Terracing proved valuable in the rolling parts of the red plains of Oklahoma, not only in slowing down erosion but in partly rehabilitating eroded land. At the erosion station in Missouri, a field badly damaged by sheet erosion and gullying was reclaimed by constructing small dams in the gullies. These dams were made with old fertilizer sacks filled with soil and bluegrass roots. The bluegrass roots grew through the bags, took hold of the ground, and established "living" dams, which quickly silted in from above with the first rains. Between the dams the gullies were seeded to wheat, which grew well. This experiment, because of its practicability and cheapness, attracted wide attention. At the Oklahoma station it was found that cotton from eroded land has less strength than cotton from uneroded land, and that the seed contains considerably less oil. The average depth of the topsoil of our uplands is only about 9 inches. In some localities this is being washed off at the rate of 1 inch in from four to eight years. In losing this layer, which contains far more plant food than the unweathered raw subsoil, the farmer is losing his principal capital. Better protection of erosive cultivated areas is a national necessity.

A representative of the department, with the cooperation of a representative of the Kansas Agricultural Experiment Station, has built a cultivator which promises to prove effective as a means of conserving soil and water in that region, and possibly in other regions, by causing more of the rainfall to sink into the ground, thus reducing erosion. This machine can be used both as a cultivator for row crops and as a surface-tillage implement for fallow. It digs approximately 10,000 holes per acre, each hole having a capacity for holding 2 to 3 gallons of rain water. Although the holes collectively impound a large amount of water, their greatest value comes from the fact that the water is

held still and given a chance to soak into the ground.

### FORESTRY

The forestry work of the department supplements its work for agriculture. Agriculture and forestry apply the same basic sciences to the same basic end of land use. Which is preferable in any given case de-

pends partly upon the physical factors that determine crop productiveness, and partly upon economic and social requirements. Continued overproduction of agricultural products has made conspicuous a need to find other ways of making serviceable a vast aggregate of potentially cultivable land. There is also the vast acreage of forest land which has no agricultural possibilities at all. The department seeks to find out how to make forestry a good form of land use and how to utilize the products of the forest to best advantage; it seeks to bring about the application of suitable forestry practices; it administers the national-forest enterprise; and it cooperates with the States for the promotion of forestry under the terms of the Weeks, Clarke-McNary, and amendatory laws.

### Forest Improvements

Congress increased the funds for national-forest improvements from \$645,000 for 1930 to \$2,500,000 for 1931. Nearly all of this was for improvements to facilitate fire control, chiefly roads and trails. Additional road and trail funds provided elsewhere in the agricultural appropriation act, in the second deficiency act, 1930, and under the continuing appropriation of 10 per cent of the national-forest receipts exceeded by \$3,545,168 the corresponding amounts for the previous year. A further increase of \$6,354,800 was made in the 1931 appropriations under legislation providing for emergency constructions of various kinds, chiefly road building, and for emergency work in the control of insect infestation. On the other hand, various cuts in appropriations for national-forest purposes other than improvements, and for fire fighting, reduced by more than \$2,000,000 the funds thus made available.

All told, Congress appropriated for national-forest improvements nearly \$20,500,000. In part this was inspired by the policy of the administration and of Congress to increase employment. What was accomplished by the Forest Service in this field is related elsewhere in the present report. The Forest Service happened to be peculiarly prepared to expand construction work along needed and approved lines. It had a carefully worked out long-time improvement program for the national forests, and its organization provided the necessary leadership for immediately inaugurating a large number of local projects.

### Fire Protection

To give the forests efficient and economical protection and to bring about full use of their resources necessitates a large investment in roads and trails, lookout houses, cabins and other administrative structures, telephone lines, and many other improvements. As protection is facilitated fire losses are reduced and the heavy costs of suppressing great fires are less frequently entailed. To complete the entire improvement program for the national forests will require a further large outlay; progress must necessarily be adjusted to the financial exigencies of the Government. That the improvements already constructed are proving a sound investment the results obtained in protecting the forests during the severe fire season of 1930 and the current year clearly show. A major advance in solving the extremely difficult problem of fire control in the West can with some confidence be claimed.

The heart of the problem is how to stop fires in bad years. Such years occur irregularly. They are the result of unfavorable weather—abnormal heat, violent winds, very low atmospheric humidity, and electric storms with heavily "bunched" lightning. Since 1905 the bad years have been 1910, 1919, 1924, 1926, 1929, 1930, and 1931. Recent years have witnessed a cumulative shortage of precipitation that has reduced the supply of ground water and affected vegetation. In most respects 1930 was as bad a year as almost any of its predecessors. But while the area burned over in the preceding five years averaged 0.29 per cent of the entire national-forest area annually, the 1930 fires were held to 0.11 per cent of the entire area.

In 1929 nearly 800,000 acres were burned over; in 1930 less than 140,000 acres. Yet the 8,388 fires in 1930 exceeded by 12.6 per cent

the number of those in 1929.

In 1930 the fire-fighting expenditures, exclusive of the time of forest officers, were less than \$1,200,000, as against more than \$3,200,000 in 1929. The fire damage in 1930 was estimated at less than \$350,000; in 1929, at nearly \$4,340,000. The difference was due partly to better preparedness. This was made possible by the larger provision of funds for improvement construction and for fire-fighting equipment. The whole work of suppression has been raised to a new level of efficiency and speed, so that fewer fires attain large size and those which do are held within narrower limits and are much more quickly brought under control.

### Extension and Consolidation of National Forests

Sound principles of land economy and public interest seem to dictate both the extension and better consolidation of the national forests by (1) the addition thereto of the remaining public lands most valuable for timber production and stream-flow protection, and (2) the acquisition of privately owned lands within national forests by exchanges therefor of national-forest lands or stumpage in the Western States and by purchase under the Weeks and Clarke-McNary laws in the Eastern States.

A recent study shows that of the remaining unreserved and unappropriated public lands in the Western States some 19,000,000 acres are of such importance for timber production or stream-flow protection as to suggest that the addition to the national forests of a considerable

part thereof would be in the public interest.

More than half of the State and private lands within national-forest boundaries in the Western States and several million acres of similar lands outside but contiguous to the national forests are integral with the public properties. The acquisition of such lands through exchanges to the possible extent of some 15,000,000 acres or more demands eventual consideration. Many opportunities for land exchanges advantageous to the United States are now available, but can be approved only where they do not involve any appreciable reduction in timber-sale receipts or the proportion thereof payable to the counties.

To date Congress has enacted a total of 66 laws authorizing the Secretary of Agriculture, with the concurrence of the Secretary of the Interior, to exchange national-forest lands or stumpage for privately owned lands within or contiguous to national forests where such ex-

changes will consolidate and improve the public properties. The net result of these 66 acts, as of December 31, 1930, has been the consummation of 691 exchange cases whereby the United States has acquired 1,005,527 acres of land valued at \$4,119,155 in exchange for 291,697 acres of national-forest land valued at \$1,538,278 and 768,563,000 board feet of national-forest stumpage valued at \$2,096,789. Besides the net gain of 713,830 acres in national-forest area, the volume of stumpage on the acquired lands is greater than that surrendered. During the year, 157 new land-exchange cases were approved and submitted to the Secretary of the Interior. These contemplate the conveyance to the United States of 304,906 acres of privately owned lands in exchange for 30,890 acres of national-forest land and \$570,844 worth of national-forest stumpage.

East of the Great Plains the national-forest lands now comprise 2,482,746 acres reserved from the public lands and 4,675,020 acres acquired by or in process of purchase under the Weeks and Clarke-McNary laws. The program approved by the National Forest Reservation Commission contemplates the ultimate acquisition of approximately 9,000,000 acres more, or eventual Federal ownership of approximately 16,000,000 acres, which would be about 4.3 per cent of the estimated forest-land area east of the one-hundredth meridian. By the act of March 3, 1931, the purchase of not to exceed 50,000 acres for addition to the Luquillo Forest in Porto Rico was authorized

by Congress.

During the year nearly 550,000 acres were approved for purchase at a cost of approximately \$1,944,000. The rate of progress is determined by the yearly appropriation, which since 1929 has provided \$2,000,000 annually. In accordance with the administration program for curtailment of expenditures the disbursement from the 1932 appro-

priation will be limited to \$1,700,000.

The transfers of land from national forests to national parks made during the year are instances of a long series of proposals of such transfers which have been almost continuous for 20 years. A number of the western national parks have been created from portions of national forests, and several others are surrounded by national forests. Necessarily many question as to the best boundary adjustments have arisen. Often the proposals have originated in local desires for anticipated local advantages. Each accomplished transfer has required a specific law. It should not be difficult to formulate definite standards of quality and function that will afford clear-cut differentiation between the lands that will serve their highest public usefulness as national parks and the lands more suitable for national forests. The problem in every case is one of social, industrial, and political economy readily determinable by systematic analysis of major factors in the light of established principles of public policy. Local pressure for one or the other form of administration ought not to control the decision. as against the large public interest. The efforts of the two services charged with the responsibility for administering these two Federal undertakings to develop a common viewpoint on the principles and purposes that should mark off their respective fields and a procedure for resolving doubtful questions as to the areas hest suited to one or the other form of administration, would be much more effective if a definite public policy were determined and established.

### Forest Receipts

The receipts from the national forests totaled \$4,993,320.08, a decrease of \$1,758,233.14, due to decreased receipts from timber, which were only slightly more than \$2,600,000. Grazing receipts, on the other hand, of nearly \$2,000,000, were a little greater than those in 1930, as were also the receipts from miscellaneous land uses; these came to more than \$400,000. Timber-sale receipts reflected chiefly the nation-wide

decrease in lumber production.

Overproduction and market demoralization have been chronic in the lumber industry for years. The national-forest timber-sale policy has therefore withheld offerings of timber that would initiate new manufacturing enterprises except to utilize overmature stands, to check insect infection or disease epidemics, to salvage dead or dying timber, or to assist dependent local communities. On the other hand, where going mills needed new timber national-forest stumpage has been made available, to promote industrial and community stability. By direction of the President, the policy of restriction of national-forest timber offerings was given redefinition and added emphasis near the close of the year. During the present economic situation sales in excess of \$500 will be made only to supply the needs of existing sawmills dependent for their new material upon the national forests and unable to obtain it elsewhere, to furnish domestic paper mills with raw material needed to supply the domestic market with newsprint and other woodpulp products, and to dispose of windthrown, insect-infested. and firedamaged or fire-killed timber.

# Cooperation with States in Forestry

Cooperation with States for the promotion of forestry is provided for under the Weeks, Clarke-McNary, and amendatory laws on a scale set by the annual appropriations. The forms of cooperation are: (1) Maintaining organized systems of protection against forest fires; (2) producing and distributing to farmers forest-planting stock; and (3) farm-forestry extension. In 1931, 45 States and 2 Territories cooperated in at least one form, 20 States in all three forms, and 19 in two. To the cost of protection the cooperating States contributed \$4,000,000, and to planting-stock production and distribution nearly \$250,000. The ratio of State to Federal expenditures for the first purpose was 3 to 1, and for the second, also 3 to 1. In addition private agencies contributed to the protection funds \$1,100,000. The area protected, 228,000,000 acres, was about 4,000,000 acres greater than that protected the previous year. Since 1925 there has been an increase of 50,000,000 acres, and an enormous upbuilding of State forestry activities, legislation, and general public interest.

The laws authorizing the three forms of cooperation limit Federal participation in each State to one-half the total outlay in that State, for the same purpose. With appropriations that do not permit a Federal matching of State expenditures, the department seeks to apportion the amount available along the most equitable and serviceable lines. The Federal participation varied from an even division of the cost in 10 States to a less than one-seventh share in 4 States. For all States combined the Federal funds made up 25 per cent of the total expenditures, State funds 60 per cent, and private funds 15 per cent.

When the Clarke-McNary law was passed, it was commonly held that for private forest land the owners should meet half the cost of protection, with the States and the Federal Government dividing equally the other half. It has become plain, however, that a large portion of the private forest land in the country is not regarded by its owners as having sufficient promise for permanent timber growing to be worth protecting at their own cost after the merchantable stand has been removed. The prospect is that much cut-over land will be abandoned in preierence to paying taxes on it. The necessity of meeting protection costs, where this is required, makes abandonment the more probable.

### Research in Forestry

The use of private land, whether now forested or cleared, for timber growing, hinges on the returns that can be looked for. Timberland owners will not make expenditures to keep their lands productive without a reasonable prospect that the investment of capital involved will turn out well. It is common to assume that timber raising is bound to pay. The lumber industry, on the other hand, is profoundly discouraged regarding the future. Enough is not yet known about costs, future returns, and methods to afford private capital an adequate guide as to where to practice forestry and what kind of forestry to practice. Further research, economic, industrial, and silvicultural, is necessary. It is needed as a guide to public policy and a requisite for public forestry, no less than as a means for furthering private forestry.

The appointment by the President of a timber conservation board has given prominence to the need for better economic data on the whole timber situation. The Forest Service is carrying forward a comprehensive long-time program of forest research, chiefly through a system of regional forest experiment stations as a central laboratory for research in forest products. The forest experiment stations conduct economic as well as silvicultural research. They are making real headway in building up the body of knowledge necessary for forestry.

### WILD LIFE

The Bureau of Biological Survey has continued research work for the solution of complex problems in the conservation and propagation of waterfowl and big game and fur mammals, and in the protection of insectivorous birds and other forms of wild life. It has continued cooperative work for the control of economically injurious species.

The cause of wild-duck sickness, long a baffling problem, was determined during the year. This disease has been taking an intermittent but heavy toll from waterfowl and shore birds for more than two decades. During certain years the mortality on some of the important concentration areas has been far greater than the total kill there by hunters. Though earlier studies (in 1914–1916) conducted under the highly saline conditions about Great Salt Lake, Utah, pointed to certain alkaline salts as the cause, evidence from the past two years' study in Oregon, California, and Utah has demonstrated that the disease is a form of botulism produced by a toxin liberated by bacteria that thrive in decaying animal and vegetable matter. Technically the organism is Clostridium botulinum, type C, best known as a cause of limber neck in domestic poultry. Remedial measures can now be taken to prevent

high concentrations of alkaline water; this will serve as a preventive of the duck sickness as now understood, because the substitution of deep fresh water of a constant level for expanses of shallow water and mud flats, with their attendant decay of organic matter, eliminates important factors favorable to the disease.

To coordinate wild-life disease investigations a new unit was established this year in the Bureau of Biological Survey, under which cooperation was continued with other bureaus of the department and with the Universities of Minnesota and Southern California. Close observations on concentration areas of wild fowl, on numerous fur and game farms throughout the country, on game refuges, and on large areas of controlled natural habitat have made it evident that disease takes a large toll of wild life and that conservation measures should include disease control as developed by research.

### Observations in Drought-Stricken Waterfowl Grounds

Investigations conducted throughout the entire country, and on important breeding grounds in Canada, indicate that the status of migratory waterfowl is more serious generally than at any time since the need was recognized for the migratory-bird treaty of 1916. Drought conditions on the breeding grounds in Canada and in the western part of the United States increased in intensity during 1930, and up to the middle of June, 1931, showed no indication of abatement. The hatch of young ducks in the Prairie Provinces of Canada in 1930 was only about half that of normal years. In this great area are bred the major part of the most commonly hunted wild ducks found in the United States during the fall and winter months. The Biological Survey has conducted continuous observations in the drought-stricken areas and has cooperated with Canadian authorities in an effort to obtain reliable information regarding critical conditions during the spring and summer, so that necessary safeguards for the wild fowl may be maintained.

# Changes in Waterfowl-Season Regulations

After consulting the advisory board under the migratory-bird treaty act, the Biological Survey recommended regulations, and these were approved, to reduce the 1931–32 season on ducks and geese by two weeks throughout the United States. To accomplish the greatest possible saving of these birds the time was taken from the beginning of the season in the Northern States and from the end in the South. In 1930 the daily bag limit on ducks had been reduced to 15 and that on geese to 4. Other amendments to the regulations restrict to 10 the number of live-goose decoys that may be used at a gunning stand and make it illegal to shoot mourning doves over baited fields. Drought conditions over three years on waterfowl-breeding areas made limitation of the annual kill imperative, and on August 25, after the close of the fiscal year, continuation of acute waterfowl conditions made it necessary to reduce the open season throughout the country to one month.

# Economic Importance of the Wild-Fowl Resources

The value of game birds becomes increasingly apparent; not only are they of great recreational value, but they also constitute an important game-food supply, and the upland game birds assist agriculture by destroying weed seeds and insects. Many thousands of families have had living conditions made more agreeable by a game-food supply or by income derived from hunting and providing for the needs and entertainment of hunters. In one State alone during the open season of 1930 more than 2,350,000 wild ducks were killed. The total annual kill of wild ducks throughout North America in recent years has

probably been between 10,000,000 and 15,000,000.

The Federal wild-fowl conservation policy has been set forth in the terms of the migratory-bird treaty act, which was passed to protect these birds through regulating the annual kill, and of the migratory-bird conservation act, a measure enacted to insure the permanent establishment of from 60 to 100 great national wild-fowl sanctuaries. The department, through research to climinate losses from disease, by careful regulation of the annual kill to prevent waste and exploitation, and by the development of a refuge system, is endeavoring to maintain the abundance of migratory birds.

### Migratory-Bird Refuges

During the first two years of the 10-year national program for the establishment of refuges for migratory game birds, approximately 4,000,000 acres in some 200 units have been studied to ascertain the nature of the wild-fowl food resources; land-valuation surveys looking toward purchases were made on 115 of these units, involving more than 3,000,000 acres in 41 States. The Migratory Bird Conservation Commission has approved the acquisition by purchase or lease of 111,517 acres at an average cost of \$3.87 an acre, in California, Colorado, Florida, Nebraska, North Carolina, and South Carolina. By Executive order four refuge areas have been reserved from the public domain in Montana, Oklahoma, Nevada, and California. Added to the lands approved for purchase, these areas bring the total acquisition under this program to 176,244 acres—representing nine migratory-bird refuges.

### Musk Oxen Reintroduced into Alaska

In the summer of 1930, 34 musk oxen were obtained by the Biological Survey through a dealer who captured them in northeastern Greenland. After their sea voyage to New York, by way of Norway, they were held in quarantine a little more than a month as a precaution against the introduction of diseases that might be inimical to other species, wild or domestic. They were then taken by rail to Seattle, Wash., by steamer to Seward, Alaska, and again by rail to the bureau's reindeer experiment station near Fairbanks. Musk oxen formerly occurred in Alaska but disappeared previous to the occupation of their range by Europeans.

# Control of Injurious Wild Animals

In the interests of all branches of agriculture, forestry, and game protection the Bureau of Biological Survey has cooperated for more than 15 years with State and other organizations in work for the centrol of predatory wild animals and injurious rodents. A special program of control drawn up by the department to cover a 10-year period and authorized by Congress during the year will make more effective the work as already organized. It will also enable the Bio-

logical Survey more adequately to conduct and supervise control operations. The leadership of the department in this work has been requested and encouraged by State and other agencies, and the funds made available from such sources for expenditure under the direction of the Biological Survey have been far in excess of those provided for the purpose from the National Treasury.

### HOME ECONOMICS

The work of the Bureau of Home Economics during the past year was adjusted so far as possible to meet the needs of homes with incomes reduced by the drought and unemployment. Advice and assistance to home makers were furnished through correspondence, radio broadcasting, press releases, and printed bulletins. These efforts were designed to serve household needs, to improve standards of living, and to promote wise use of agricultural products in the home. The program included special studies in low-cost diets, the preparation of food guides for use of extension workers and others in the drought areas, and the dissemination of facts as to cheap sources of "protective foods," especially those containing the factors that prevent pellagra. Thousands of charts and leaflets were distributed for this purpose. In response to a call from the women's division of the President's Emergency Committee for Employment, similar service was extended to families with incomes reduced by unemployment. Recipes for low-cost diets were worked out and distributed.

In cooperation with other institutions the bureau studied the selection of food for children. A report has been prepared indicating the part the nursery school can play in providing adequate meals for children from 2 to 6. Another publication, Food for Children, based on an experiment in child feeding at the Washington Child Research

Center, has been issued.

The bureau participated in the work of the White House Conference on Child Health and Protection. It is represented on the planning committee of the President's Conference on Home Building and Home Ownership, which is collecting data that should be of great value in bettering housing and home-living conditions.

# Study of Consumer Needs

Dictary surveys of different population groups are in progress. The records, showing consumption trends, are checked against nutritive needs to guide both production and consumer demand. Other investigations deal with the quality of agricultural products. Tests of the palatability of meat as affected by different production factors and by different methods of cutting, handling, or cooking are conducted in cooperation with the Bureau of Animal Industry and the Bureau of Agricultural Economics. The meat used is produced at State agricultural experiment stations. The effect of breeding, fertilization, and storage upon the cooking quality of potatoes is tested in cooperative studies with the Bureau of Plant Industry and the Bureau of Chemistry and Soils. Comparative cooking tests on eight native-grown varieties of rice have shown different lengths of time for satisfactory cooking, thereby lending support to the contention that varieties should not be mixed for marketing.

### Studies of Fabrics

Studies of fabrics deal with the wearing qualities of household materials manufactured from different grades of cotton and wool. Sheets and blankets manufactured from different grades of these materials are

tested under controlled conditions of constant use.

Textile-utilization experiments were continued to determine new and more satisfactory uses for fibers grown in this country. The results were made available in popular publications. A farmers' bulletin on window curtaining, a leaflet on slip covers, and another on furnishing living rooms were prepared to encourage a wider use of cotton materials, as well as to help farm families in improving their homes.

### Basic Research

Investigations were continued regarding the standard of living of families on marginal farms in the Appalachian highlands. Information thus obtained was correlated with facts regarding the size and sources of family incomes, the types of soil farmed, the uses made of land, and the character of the schools and other community facilities. Preliminary reports were presented at a conference with the extension service of the University of Kentucky, and at a meeting of the Kentucky Home Economics Association. A second survey was begun in June in Grayson County, Va., an Appalachian community of a somewhat different type.

A study of the food supply of 73 families on marginal farms in South Carolina, where pellagra is prevalent, compared the food habits of families that had escaped the disease with the food habits of families that had not escaped it. It also included comparisons with families of similar economic status and similar diet in mountain regions of Kentucky. The study showed the beneficial effects of adding different

amounts of certain pellagra-preventive materials to the diet.

The use of wheat germ and rice polish is recommended in communities where the diet commonly lacks vitamins B and G. These products, however, tend to grow rancid under the usual conditions of storage, and their use is consequently limited. Accordingly a method was sought whereby the home maker might retard the tendency. It was found that wheat germ and rice polish may be preserved by heating them for 9 or 10 minutes in a %-inch layer at 190° C. Formulae were worked out for enriching corn meal with dried skim milk or a combination of dried skim milk and wheat germ or rice polish. Wheat germ is as rich in vitamin B (the antineuritic vitamin) as yeast, and one-half to one-third as rich in the antipellagra vitamin (†. Cotton-seed tlour, slightly less rich in both vitamins, would afford ample amounts of the pellagra-preventive factor for most diets, if used in the quantities found desirable for baked products.

Experiments with meat held at different temperatures showed that the development of bacteria advances markedly at temperature above 50° F., and that meat should be kept at the same low temperature as

that recommended for milk (45° or below).

### FOOD AND DRUG ADMINISTRATION

The Food and Drug Administration, a separate bureau of the department, is charged with the duty of enforcing the food and drugs act, the insecticide act, the tea act, the naval-stores act, the import-

milk act, and the caustic-poison act.

The independent-bureau status of the Food and Drug Administration is emphasized here because a mistaken idea prevails in some quarters that analytical work incident to the enforcement of these various laws is performed by another bureau of the department, administrative details alone being centered in the Food and Drug Administration. A natural inference from such a misunderstanding would be that the regulatory operations are subject to divided control, a situation which obviously would be conducive to bad administration.

June 30, 1931, marked the twenty-fifth anniversary of the passage of the food and drugs act. Since the measure was passed, revolutionary changes in the food habits of Americans have taken place. Manufactured foods have become a stable and highly important item in the diet of those who live on the farm, as well as of those who dwell in cities. The progressively increasing demand for commercially prepared foods has effected marked changes in manufacturing methods and brought into the field large numbers of new manufacturers. This, and an increasing expansion in the drug and medicine manufacturing trades, have thrown a heavy burden on the Food and Drug Administration. Necessarily limited in personnel and working funds, the administration has concentrated on types of violations which endanger the public health and constitute serious economic frauds upon the consumer. While various attempts to weaken the act have been unsuccessful, and while in general the broad terms of the measure have been remarkably effective, the experiences of the last 25 years have clearly shown that the measure in its present form does not insure all the safeguards to the American consumer that its framers presumably intended. Consequently the department expects to recommend desirable amendments to the act.

### Prosecutions and Seizures

In the course of import and interstate operations under the food and drugs act during the fiscal year ended June 30, 1931, the administration collected and examined 31,859 samples of foods and drugs. Prosecutions and scizures under the law numbered 991 in the case of foods, 885 in the case of drugs, and 101 in the case of livestock feeds, totaling 1,977 actions. Import inspections resulted in the passing of 4,899 shipments of food and 1,842 of drugs, while 2,469 shipments of food and 1,321 of drugs were detained. Since the passage of the law more than 18,000 legal actions have been instituted, involving both the seizure of offending goods and the prosecution of shippers.

# McNary-Mapes Amendment

New tasks were imposed upon the technical forces of the administration by the passage on July 8, 1930, of the McNary-Mapes amendment to the pure food law. Since no special appropriation was made for earrying on work under the amendment, many technical investi-

gations of the administration were temporarily forced into the background following the passage of the measure. The formulation of standards of quality and of condition and fill of container is necessitated by the amendment. Six important classes of canned foods were chosen for preliminary work. These were peas, peaches, pears, apricots, cherries, and tomatoes, for all of which standards were promulgated during the year. The designation "Below U.S Standard. Low Quality, but not Illegal" was adopted for use in labeling substandard products.

# Corn Sugar Under the Food and Drugs Act

On December 26, 1930, a decision defining the status of corn sugar (dextrose) under the law was announced in the following terms:

Corn sugar (dextrose) when sold in packages must be labeled as such; when sold in bulk must be declared as such; but the use of pure refined corn sugar as an ingredient in the packing, preparation, or processing of any article of food in which sugar is a recognized element need not be declared upon the label of any such product.

Nothing in this ruling shall be construed to permit the adulteration or imitation of any natural product, such as honey, by the addition of any sugar or other

ingredient whatever.

In order to bring the existing definitions and standards for food products into conformity with this decision, the definitions and standards as previously published were revised.

# Offenses Involving Public Health

Foods may become dangerous through contamination with poisons, through the development of certain forms of bacteriological decomposition, or through the presence of disease germs. To-day, such contamination is rare in commercially packed foods. The increasing efficiency of commercial food-manufacturing methods in the United States is illustrated by the fact that in the last two fiscal years the administration has encountered no cases of botulism attributable to

commercially packed food.

The canning of prunes, an expanding industry in the Pacific Northwest, necessitated some control by Government agents. The 1930 pack, 660,000 cases, was considerably smaller than that of 1929, due to unfavorable weather. The harvest season for prunes in the Pacific Northwest generally comes in September, and at that time last year continued rains and cloudy weather were responsible for the rapid development of brown rot which infected approximately 40 per cent of the crop and caused heavy losses to the industry. The heavy infestation required immediate regulatory action. Officials collected 49 official and 108 investigational samples for examination. This resulted in 20 seizures, involving about 4,500 cases of canned prunes.

A significant legal action concluded during the year involved the interstate shipment of approximately 43,000 cases of canned salmon, found to be partly decomposed. Following seizures of the goods, criminal prosecution was instituted, and the Federal judge of Seattle, Wash., imposed fines of \$350 and \$300 upon the two offending shippers, at the same time expressing regret that the limitations of the

statute prevented the imposition of jail sentences.

### Actions Involving Drugs

The Food and Drug Administration tries to protect the public against patent medicines bearing curative claims far in excess of their actual merit. Fraudulent claims made regarding the curative value of an illegal remedy have always been regarded by the department as a definite public menace. During the past fiscal year 570 seizures of falsely and fraudulently labeled proprietary medicines were made.

During the calendar year 1930, 6,189 cans of anesthetic ether were examined. Of these, 313 were found not of United States Pharmacopoeia quality; 82 lots were libeled. A 5-year campaign against impure or low-quality anesthetic ether has resulted in a marked improvement in the quality of this important product. Of 470 cans examined in 1926, 162, or 34 per cent, were found to be low in quality and unfit for anesthetic purposes. Only 5 per cent of the cans examined in 1930 were found to fall in that class.

### Worthless Veterinary Preparations

Progress has been made in the department's efforts to protect the farmer against ineffective veterinary remedies. Interstate commerce has now been cleared of preparations falsely and fraudulently labeled as having therapeutic value in contagious abortion of cattle, hog cholera, and tuberculosis of livestock. Careful surveillance was maintained over proprietary veterinary preparations labeled as having therapeutic value for other diseases of farm livestock and poultry. Internal parasites are of considerable economic importance to the farmer in that they cut down the producing ability and thus the value of his animals. Critical tests of a number of vermifuges were made. An important case, involving a group of veterinary preparations falsely represented as treatments for black tongue, distemper, and running fits of dogs, was concluded at New Orleans when the Government secured a verdict in a contested action.

# Other Regulatory Activities

Nearly 1,500 insecticides and fungicides were examined and, when necessary, submitted to field tests. Thirty cases, representing apparent violations of the law, were reported to the Department of Justice for criminal or seizure proceedings. Disposition of 447 cases involving misbranded insecticides and fungicides was made. When the mislabeling was called to the attention of the manufacturers, they voluntarily made the necessary changes, making it unnecessary for the Government to resort to legal action. Many new combinations in insecticides and fungicides appeared upon the market during the year, requiring considerable laboratory analysis and testing.

A country-wide survey, begun in 1928, of products subject to the caustic poison act was completed. At the close of the fiscal year 1931, 70 per cent of the many thousands of labels encountered were in exact compliance with the requirements of the law. During the year 1 seizure under the act was instituted, and 16 additional cases are in the course of development.

Under the service features of the naval stores act the department's classifiers graded 181,429 barrels of rosin. The collections for this service work, which were turned over to the United States Treasury

as miscellaneous receipts, amounted to \$13,913.62. Two prosecutions covering definitely willful violation of the naval stores act were

terminated successfully.

The quantity of tea offered for importation during the fiscal year 1931 was 87,091,330 pounds, an increase of about 2,500,000 pounds over the total importations for the fiscal year 1930. Slightly over 49,000 pounds were rejected, this being only 0.057 per cent of the

total quantity offered for entry.

Enforcement of the import milk act is centered at Rouses Point, N. Y., in the heart of the section through which most of the milk from Canada enters the country. As a result of farm and plant inspection work provided for under the act a change for the better has taken place in the sanitary condition of dairy farms, and in plant practices. This improvement was reflected in importations of milk and cream of a uniformly high quality. Many of the plants under supervision have installed a definite farm-inspection and milk-testing system as a routine practice. During the fiscal year 1931, 170 plants and 1,756 dairy farms were inspected. Products from 143 dairy farms were embargoed, and 50 foreign farms were released from previous embargoes. One hundred twenty-five permits to import were renewed.

### TRADING IN GRAIN FUTURES

Trading in wheat futures in the United States showed a sharp decrease as compared with such activity during the previous fiscal year. The total volume of trading on all exchanges designated contract markets under the grain futures act of 1922 amounted to 10,063,139,000 bushels during the year ended June 30, 1931. While this is nearly 50 per cent less than the volume for the previous year, when total sales aggregated 19,606,790,000 bushels, it nevertheless exceeds the low record in 1923–24 by about 38 per cent.

Decreased activity in wheat futures was due in part to the shifting of speculative interest to corn, where a short crop and a closer adjustment between supply and demand furnished greater incentive to speculation. This was reflected in a 50 per cent increase in the volume of trade in corn futures over that of the previous year. Trading in corn futures during the fiscal year ended June 30, 1931, amounted to 5,505,123,000 bushels, as against 3,667,885,000 in 1929–30. The lastnamed figure, however, was the smallest of record and showed about

half as much trading as was done in 1924-25 and in 1927-28.

Some of the decline in trading in wheat futures resulted from the stabilization activities of the Federal Farm Board, in that speculation was naturally reduced in the December, March, and May futures, which were supported by the Grain Stabilization Corporation. Not all of the decline, however, can be attributed to that cause. The unusually large stocks of wheat, a limited foreign demand accompanied by declining prices, and the unsettled condition of the stock market and business generally throughout the world had a marked effect in minimizing speculative interest of all kinds. In this connection, it may be noted that while trading in all grain futures combined during the year ended June 30, 1931, was 17,034,201,000 bushels as against 24,999,650,000 the previous year, a decrease of about 32 per cent, the decrease in the trading in securities on the New York Stock

change during the same period was even greater. The number of shares sold from July 1, 1930, to June 30, 1931, amounted to about 667,000,000 as compared with 1,080,000,000 the previous year, or a

decrease of about 38 per cent.

Though the volume of trading in wheat futures during 1930-31 was relatively small, the amount of open contracts reported to the Grain Futures Administration by members of contract markets was large. This contrast is largely explained by the heavy stocks that were carried forward and hedged. It appears that the hedges were absorbed and carried mainly by the so-called general public and by the Grain Stabilization Corporation, which bought large quantities of wheat in the futures markets and took delivery. The general public composed of small traders is usually found on the buying side. It was on the buying side last year, when prices were declining. On the other hand, the so-called large professional traders operated primarily on the short side. This may have reflected superior judgment on their part, but it certainly added to the load on the bear side of the market. Hedgers, however, had a fair measure of protection during the year owing to the prevailing favorable relationships between cash-grain prices and prices in the futures markets.

### Stabilization Operations

Special interest attaches to the results of stabilization operations conducted by the Federal Farm Board between November 15, 1930, the date when stabilization was authorized, and May 30, 1931, when the May future expired. These operations related to the 1930 wheat crop, and established the basis upon which most of that crop was sold. Prior to November 15, Chicago July wheat had sold slightly above the May wheat, but prices had steadily declined since the second week in August. The July future at Chicago continued to decline. It sold below 60 cents in March and again in April and May, 1931. The May price, on the other hand, was stabilized by the Federal Farm Board at above 80 cents throughout most of this period. After stabilization was discontinued the price of the July future declined to lower levels, and on the last day of July sold under 50 cents. Chicago May wheat during January, February, March, April, and May was above the Liverpool price by from 15 to 20 cents a bushel. Normally, when the United States has an exportable surplus of wheat, the Chicago price is below the Liverpool price. Besides being held at a higher level during the stabilization period, the May future was kept within a very narrow range of fluctuation. The average daily range from November 15 to May 30 in the May future was only half a cent a bushel, whereas in the July future the average daily range was 1% cents. In the dominant futures from May 1, 1930, to November 15, 1930—that is to say, in the five and one-half months preceding the board's stabilization operations—the average daily range was 2% cents. It is thus obvious that much of the 1930 wheat crop brought prices considerably higher than the prices that would have ruled had the Federal Farm Board not entered the market.

### Action Needed to Correct Abuses

Grain exchanges and grain-futures markets play an important part in our marketing system. The hedging facilities which are offered mill-

ers and dealers generally serve useful purposes, and, on the whole, these markets function efficiently. Action is required, however, to eliminate certain abuses. I referred to this matter in my annual report last year and wish to reaffirm here what I then said. Legislation to strengthen the present grain futures act seems desirable, to eliminate sharp practices in the handling of customers' orders, and to afford a safe and sure means of control over the purely speculative trading of large operators. Under existing conditions the unrestricted opportunity to buy or sell futures enables large traders at times to take advantage of technical situations to the disadvantage, not only of producers and cash handlers of grain, but of the small traders composing the general trading public. Small traders are necessary to maintain a liquid futures market. They should be guaranteed fair play and a fair chance against those with larger means. This is said not to encourage speculation but to emphasize the necessity of making the futuretrading system equitable. It should extend equal opportunity to all traders so that its benefits may flow as directly as possible to the producers of grain and the handlers of actual grain and grain products. Existing legislation does not give the Federal Government authority to limit excessively large speculative lines or to limit short selling calculated to demoralize prices.

### EXTENSION SERVICE

Supplementing sources of farm income and maintaining as good a standard of living on the farm as possible with the income in hand were the chief problems to which extension workers gave attention this year. Price-breaking surpluses of wheat and cotton necessitated large production adjustments. The development of new sources of income became imperative. Supplemental lines of production had to be considered and adopted. County extension agents were constantly busy studying the situations in which producers found themselves individually and collectively. Reliable and practical information from State agricultural colleges and the department was in pressing domand. Consulting with farmers as to their operations is not a new activity of extension agents. Crop adjustments have been made with the aid of extension workers in many counties and in entire States. It is a recent development, however, for the entire force of the cooperative extension service to direct its attention largely to problems of agricultural adjustment the country over. Extension problems this year were more numerous, more complex, and more widespread than ever before.

The California Extension Service reported striking results from a 10-year campaign to put dairying on a sound and profitable basis. Production was so increased in volume and efficiency that California's dairy industry in 1930 had a gross income \$25,000,000 greater than that of 1920. The campaign was undertaken following a thorough study of the industry's requirements, prominent among which was greater stability. The objectives were outlined, and the work was

conducted steadily to a successful issue.

Extension workers this year helped producers throughout the country to map out programs. Where it seemed advisable to curtail or abandon a line of production, substitute crops or enterprises were considered. Many farmers were encouraged to develop new activities.

They undertook in increased numbers to grow home and farm supplies as much as possible and to build up reserves of feed, seed, and livestock. North Carolina produced \$20,000,000 worth of food and feed more than in 1930. This is an outstanding example of the advantages obtained. The farm women and girls of that State are credited with putting up 2,250,000 quarts of home-grown fruits and vegetables in the past season.

### Soil-Improvement Systems Adopted

In many districts definite systems of soil improvement were adopted, wood-lot and forest-area developments were started, and minor cash enterprises were launched to make up deficiencies in the income from major crops. Closer attention was given to the grading, pooling, and selling of marketable crops. Existing cooperative-marketing associations were strengthened and new ones organized. The establishment of credits on a sound basis was promoted and the use of credit encouraged where adequate returns could be expected. In this last effort local banking institutions and bankers' associations cooperated.

The department and the State agricultural colleges speeded the assembling of economic facts applying to local conditions. At a series of four regional conferences, State and Federal extension workers and economists considered available data. State workers returned to their own fields better equipped to aid in appraising local situations. At local conferences producers were helped to plan their individual farm programs. To strengthen this work 120 economic workers were added

to the extension forces.

Home demonstration agents assisted farm women and girls in preparing and selling surplus garden, poultry, and dairy products. The development of home industries progressed. More than 200 operators of roadside markets attended a conference held in New Hampshire at the instance of the State extension service. The West Virginia Extension Service began the promotion of attractive tourist homes and supplemental home industries as sources of income to farm families. Farm women and girls were helped also in the economical buying of supplies, in the preservation of home-grown foods, in the making and remodeling of garments, in the refinishing of furniture, in the making of inexpensive improvements in the house, and in the planting and care of flowers and shrubbery. No other phase of home-demonstration work met with more appreciation than that resulting in the beautifying of the home and its surroundings.

Boys and girls joined in the general effort to augment farm incomes and maintain farm living standards. More than 845,000 were enrolled in 4-H clubs, in which, under the supervision of extension agents, they studied and demonstrated efficient farming and home making. The growing of cotton, corn, potatoes, and other vegetables and the care of calves, pigs, and poultry gave them training in production and marketing. Their activities included preserving fruits and vegetables, cooking and serving meals, making and remodeling clothing, and

furnishing and decorating rooms.

The field force employed in extension work on June 30, 1931, totaled 6,179 persons, an increase of 219 over the number last year. In the counties 2,382 county agents, 234 assistant agents, and 167 negro

agents were employed. The home economics staff included 1,241 county home demonstration agents, 36 assistant agents, 10 urban agents, and 123 negro agents. Two hundred and eighteen county club agents and 33 assistants devoted full time to 4-H clubs. Practically all county extension agents gave some time to boys' and girls' clubs. To reenforce the efforts of county extension agents and to assist in dealing with specialized problems there were 1,222 extension specialists stationed usually at the State agricultural colleges. The administrative and supervisory staff in the States numbered 495 persons.

# Appropriations for Extension Work

Federal appropriations amounting to \$6,192,936 were allotted to the 48 States and the Territories of Hawaii and Alaska for extension work under the terms of the Smith-Lever Appropriation Acts and \$1,480,000 was allotted under the terms of the Capper-Ketcham Act. A special appropriation of \$1,000,000 for allotment to the States was made available by the Congress, primarily for extension work in economics and marketing. The direct Federal appropriation for extension work was \$1,755,000, of which \$1,550,000 was for farmers' cooperative demonstration work and motion pictures, \$15,000 for general administrative expenses, \$120,000 for exhibits, and \$70,000 for farm-forestry extension. The States, counties, and other agencies contributed \$15,876,250 for cooperative extension work. The total of all these items available for cooperative extension work with the State agricultural colleges and for motion pictures and exhibits was \$26,304,186.

### INFORMATIONAL WORK

When times are hard for the farmer, technical and economic information that he can put to practical use becomes all the more necessary. The department, consequently, increased its efforts this year to give the public information developed by its research, service, and regula-

tory activities.

Increased funds, made available by Congress for printing and binding, permitted increased publishing. Manuscripts sent to the printer totaled 1,737, as compared with 1,702 in the previous fiscal year. The number included several emergency publications necessitated by drought and unemployment relief work. Publications are the permanent foundation of the department's informational work. For years there has been considerable delay between the completion of a research project and the publication of the results; now this gap is being narrowed. In the act creating the Department of Agriculture, Congress made the dissemination of knowledge by the department as important a duty as the acquisition of knowledge. Evidence of the extent to which this function is being discharged is furnished by the demand for the department's publications, which are not foisted upon persons who do not desire them, but are mailed only on request. Hence, the fact that nearly 32,000,000 copies of various classes of publications were distributed in the last fiscal year indicates that the publication program is adapted to its purpose. Approximately 12,500,000 of the publications distributed were farmers' bulletins, and 2,058,538 were leaflets. About 17,000,000 copies of technical, semitechnical, periodical, and miscellaneous publications were issued.

### Press Aids Department

It would be difficult to overvalue the help of the press in disseminating agricultural information, particularly in times of economic disturbance, when speedy communication is essential. All scientific facts should be made known quickly. Economic information especially demands almost instantaneous distribution. The press furnishes valuable aid in doing this. Press cooperation is particularly valuable in disseminating data about crops and markets. The press also devotes much space to results gained by the department in production studies, in the control of animal and plant pests, in chemical research, in meteorology, in forestry studies, in wild-life conservation, and in home economics. Though most publications have been forced by the depression to reduce their size, releases issued by the department seem to have been used about as fully and widely as formerly. It is generally recognized by the press, both daily and periodical, that the material issued by the department has practical value. This is shown by a growing demand, not only for press releases, but for articles by the department's specialists. Press associations and syndicates carry such articles regularly.

### The Radio Service

Important advances continued during the year in the department's radio work, further enhancing the valuable service rendered agriculture by this new medium of communication. Radio broadcasting makes available to the farmers much economic and technical information that might otherwise not reach them or might reach them too late to be of full value.

A new network program, originating on the Pacific coast and broadcast in the Pacific and intermountain regions by 8 stations associated with the National Broadcasting Co., was started. In the last two years the department's broadcasting has grown tremendously. In the early part of 1929, it issued one network program through 17 radio stations. It is now issuing two daily programs and one weekly network program through 55 radio stations. Two years ago it put out syndicate programs through 164 stations. 'Similar manuscript programs now go to the audiences of 234 stations.

Land-grant colleges are cooperating with the department in extension broadcasting, and in surveying broadcasting requirements and possibilities. The projected Federal-State extension program envisages daily 15-minute syndicate programs broadcast through more than 250 cooperating commercial stations. One-third of the land-grant

colleges themselves operate radio stations.

It was found desirable in broadcasting to continue emphasizing economic information. The national farm and home hour, the western farm and home hour, and department programs on more than half the individual stations in the United States proved effective means of sending rush information to farm people throughout the country. Better cooperation between agricultural program makers and the nation's broadcasters is desirable. Better correlation between Federal and State subject matter is also necessary. Both these ends are being sought.

### WEATHER BUREAU

Diminished precipitation last year and again this year over large areas was reflected in river stages which in the main were low. This circumstance enabled the Weather Bureau to repair its river gauges and verify zero points. It afforded an opportunity also to strengthen the river-stage service in other respects. Some additional river-stage stations were established. Recent engineering developments, including the building of fine roads and bridges, the development of water resources, and flood-protection work necessitate a more exact study of river stages and a more adequate flood-forecast service. The measurement of low-water stages, which formerly was relatively unimportant, now must be done with extreme care. The Weather Bureau took advantage of the exceptional conditions prevailing this year to improve its facilities for making these measurements. Important advantages are expected, particularly to river navigation, which depends mainly on the Weather Bureau for information about river stages and ice movements.

Extensions were made by the Weather Bureau during the year in its daily weather service, principally in the facilities for obtaining observations from ships in the North Atlantic, the South Atlantic, the Caribbean Sea, and the Gulf of Mexico. In accordance with international agreements, more reports were received from ships of foreign registry. Daily radio bulletins containing ship reports and observations from representative land stations in Europe and Asia were received. This information was particularly welcome because weather reports from overseas previously had not been received regularly. Such reports are now collected at the British Meteorological Office and transmitted to the United States Weather Bureau through radio stations at Rugby and Bar Harbor. Arrangements were made also for getting additional information on barometric changes, on the time and character of precipitation, and on humidity conditions in the United States and Canada.

To meet increasing demands for special forecasts for agriculture, aviation, and other interests, the Weather Bureau, with funds specially provided by Congress, began training forecasters. Candidates selected from members of the Weather Bureau were taught how to prepare maps and interpret weather reports. They received special instruction in meteorology, physics, and mathematics. After preliminary training in Washington, the class was distributed among field stations.

# Service for Air Navigation

Following the passage of the air commerce act in 1926, the annual appropriations of the bureau have provided for notable extensions of

its meteorological service in aid of air navigation.

At the close of the fiscal year June 30, 1931, approximately 9,400 miles of airways were provided with continuous, 24-hour service. This represented an increase for the year of about 3,400 miles. In addition, partial service (reports collected only for scheduled flights) was organized for about 3,000 miles of new airways, making a total of about 6,000 miles partially served, or a grand total of about 15,500 miles.

Along with the development of this network of frequent current reports, a system of airways forecasts every three hours was organized with an extension during the year to three additional centers, Atlanta, Dallas, and Portland. With those previously organized at Cleveland, Oakland, Omaha, and Salt Lake City the country is well covered, except in the northern and southern Plains States and the extreme Northeast and Southeast.

Airways service in Alaska was extended by the establishment of a station at Nome with facilities for making pilot-balloon observations. Airways stations were established also at a number of other points. These stations report on schedule for plane movements by radio, telephone, or telegraph. A number of airways stations were established in the Hawaiian Islands to make reports for interisland flying.

Ten additional pilot-balloon stations were established during the year. One was established at Akron, Ohio, primarily to investigate the effect of wind gustiness on dirigibles.

### AGRICULTURAL EXPERIMENT STATIONS

Through its Office of Experiment Stations the Department of Agriculture maintains close relations with the agricultural experiment stations of the several States and with those of Alaska, Hawaii, Porto Rico, Guam, and the Virgin Islands. It is cooperating with these stations in more than 1,000 research projects, or more than 15 per cent of the projects in which the stations are engaged. This cooperation economizes effort, coordinates different investigations, and prevents duplication of work.

The Federal Government contributes annually about \$4,500,000 to the experiment stations, whose total funds are approximately \$18,000,000 annually. Evidence of the value attached to these institutions is shown by the fact that their support from State and local appropriations and from donations and endowments has increased greatly in recent years. The money spent annually by the stations comes to about \$3 per farm in the United States. It is impossible to measure the money return, but it is unquestionably large.

Research in which the department cooperates with the stations covers national, regional, and local problems. It has to do with the needs of the farm home and with rural-community matters as well as with the production, distribution, and sale of farm products. The results are disseminated by colleges and schools of agriculture, as well as in textbooks, treatises, and bulletins. Experiment station findings obtain wide publicity, also, through the rural press and the radio. They are translated into farm practice especially through the extension services of the different States.

### Activities of Insular Stations

Special efforts were made during the last year, through the agricultural experiment stations of Alaska, Hawaii, Porto Rico, Guam, and the Virgin Islands, to improve agriculture and rural life conditions in these territories. The work was aided by certain important changes authorized by Congress and by local legislatures in the status of these stations. Under an act of Congress approved February 23, 1929, whereby the benefits of the Hatch Act were extended to Alaska, an experiment station was established in connection with the Alaska Agricultural College and School of Mines. A station operated by the department at Fairbanks, Alaska, since 1907 was merged with the

new organization. This change will extend the scope, effectiveness and application of the research and service work undertaken. It will

also encourage local participation in the work.

In Hawaii a consolidation of experiment station work under the joint supervision of this department and the University of Hawaii, which was provided for by an act of Congress passed May 16, 1928, brought about increased efficiency and economy. This legislation, like that passed with reference to Alaska, extended the benefits of the Hatch Act and supplementary acts to Hawaii.

A similar measure approved March 4, 1931, extended the benefits of the Hatch and supplementary acts to Porto Rico. This measure provided for the coordination of experiment station work in the island in accordance with plans approved by the Secretary of Agriculture. The required coordination is under way. It will bring about joint action by the Federal authorities, the insular stations, and other agencies

interested in improving the agriculture of the island.

Federal research workers cooperated during the year with the experiment station in the Virgin Islands in efforts to improve agricultural conditions there. Important benefits are expected from a soil survey of a portion of St. Croix which was completed by the Bureau of Chemistry and Soils. Studies were made to determine whether the bay-oil industry, in which the Virgin Islands formerly excelled, can be improved. Federal entomologists cooperated with authorities of the experiment station in a survey to ascertain whether the pink bollworm could be controlled and the cotton industry restored in the islands.

ARTHUR M. HYDE, Secretary of Agriculture.

# WHAT'S NEW IN AGRICULTURE

ALFALFA-STEM Nematode
Causing Severe Damage
in Some Western Areas

In recent years the alfalfa-stem nematode, Tylenchus dipsaci, has appeared in certain areas of the Western States. Its ability to in-

jure the crop severely has been demonstrated in almost every instance, the amount of damage sometimes being one-half to three-fourths of the

crop. The heavier losses occur on fields in which the alfalfa has been allowed to remain growing for five or more years, younger alfalfa growth seldom being severely infested unless planted immediately after an old infested crop was removed from the same field.

# Description and Habits of the Stem Nematode

The organism causing the disease is an active, slender, nearly colorless, ecllike worm averaging about one-twentieth of an inch in length. Its mouth bears a strong spearlike organ with which it punctures the plant tissues and makes an opening through which it enters.



FIGURE 1.—Shoots from an infested plant showing the typical clubbed appearance

The opening is usually at the growing point of the shoot or at the leaf axils. The nematodes pass the winter in a quiescent, inactive state in the small alfalfa produced in the fall and in the soil and rubbish about the crowns. With the advent of spring they attack the first young shoots of alfalfa as soon as they appear. Frequently the shoots are killed outright, but if they survive the attack they become thickened, clublike, and deformed. (Fig. 1.) As the season advances these stems will be found to have swollen, blackened bases which break off easily when pulled, and the interior will be found decayed. Such stems frequently die after growing a foot or two high. Occasionally colonies of nematodes become established a foot or more above the ground and cause swollen areas on the stems. (Fig. 2.)

Microscopic examination of an infested stem reveals thousands of nematodes in all stages of growth. Those that enter in the spring are usually, if not always, the preadult form, and after feeding for a few days they mature and mate, and egg production begins. The eggs hatch immediately, the young begin feeding, and the colony soon contains nematodes in all stages of growth. Several generations occur in a single season.

If the plant dies, most of the nematodes leave and migrate to surrounding plants if the soil is moist. Such migration is not possible through dry soil. For this reason, plants that once have been heavily

infested may not contain nematodes if examined after they have died.

Appreciable injury the first year of infestation is uncommon unless unusually large numbers of nematodes are present, but in the second year the killing of the shoots and the subsequent decay of of the crown may weaken the the plant rapidly. However, it may survive for many years depending upon its vitality, the fertility of the soil, and the severity of the infestation.



Fig. 1 RE 2 - Alfalfa plant infested with stem nematode

# Appearance of Infested Fields

Infestation usually first appears in small areas and is indicated by stunted or dying plants. The size of the damaged area increases year after year, especially in the direction of water flow. This is a

marked feature in irrigated fields. Injury is usually most prominent in the first cutting of alfalfa, for the cool, moist spring months appear to be more favorable for the nematodes. Later in the season it may be difficult to find typically infested shoots.

### Control

Crop rotation is the only known method of control under ordinary field conditions. Under a systematic crop rotation in which alfalfa is allowed to remain not over three or four years, there is less danger of serious loss. When an alfalfa field becomes infested to a point where serious loss occurs, it should be plowed up and planted with other crops for at least two or three years, care being taken to eliminate all alfalfa plants and weeds. Suitable crops for rotation include sugar beets, wheat, corn, barley, beans, and peas.

Fortunately the alfalfa-stem nematode, so far as known, does not adapt itself readily to other plants in this country, but in certain foreign localities it has been found to infest oats, potatoes, and clover seriously. Therefore, while the nematode may not attack these crops in

the Western States, it is advisable not to use them in a rotation on an infested alfalfa field if others in the list of suitable plants can be grown

advantageously.

The most common means of transportation into a locality is infested seed that carries the nematodes in dirt and fragments of infested stems. To prevent introduction of the nematodes into clean fields only well-cleaned seed should be used. Seed that has passed through the cleaner two or three times is much less likely to carry nematodes.

Distribution from infested areas to neighboring fields occurs through the movement of hay, soil, machinery, and irrigating water. Therefore, when once an infestation is located, care should be exercised to

avoid spread.

GERALD THORNE, Bureau of Plant Industry.

BEE-CULTURE Research Recently Inaugurated on the Pacific Coast

In the spring of 1931, the Pacific Coast Bee Culture Field Station of the United States Bureau of Entomology was established in the new.

mology was established in the new, fireproof Animal Science Building of the College of Agriculture, University of California, on the university farm at Davis, Calif.

At this station it is planned, not only to undertake problems in bee-keeping which pertain to California, Oregon, Washington, Nevada, and Arizona, but also to include such other research of general importance to the industry as can best be studied on the Pacific coast.



FIGURE 3 -4 1,000 colony apirry which was moved into the Porterville, Calif., orange area for the orange honey flow; 25 000 colonies were moved into this area for a few weeks

An increasing demand for research in beckeeping has accompanied the changes in agriculture in the great honey-producing territory of the Pacific coast. New problems confronted the beckeeper as the ranches turned from the production of beef to wheat, then to alfalfa, and more recently to cotton and deciduous and citrus fruits, or to vegetables and seeds. Associations of beckeepers felt that Federal research was necessary, and the new station was established to meet this need.

The station is now attacking basic problems confronting the industry, thus laying foundations for detailed research. Studies of the economic aspects of the beekeeping industry and of the relationship between beekeeping and the production of fruit are being made. Conditions are being investigated to ascertain why beekeeping is carried on with profit in some Pacific coast districts and why it is not profitable in other districts. This necessitates a study not only of production and distribution of beekeeping products but also of beekeeping man-

agement, of the distribution of nectar-secreting flora, and of weather and soil conditions, as all these factors have definite and important influences on the income which a beekeeper may derive from his business.

# Relationship Between Beekeeping and Fruit Growing

Recognition of the important rôle played by the honeybee in production of crops of fine fruit has brought about increased use of bees for pollination. The relationship between beekeeping and fruitgrowing is not yet clearly understood either by the beckeepers or by the fruit growers. The two activities should be of mutual benefit, but there are a number of problems, such as the use of poisonous insecticides and the belief in some quarters that the honeybee is one of the agents in the spread of fire blight, which for the time being complicate the issue.

Some important tasks of the station, therefore, will be to work out satisfactory practices for pollinating orchards in sections where heavy losses of bees from poisoning may be expected, and to determine exactly what part honeybees play in the dissemination of fire blight, as well

as to prepare standards of strength and number of colonies.

With the establishment of the new station, the honey producers in the great beekeeping territory of the Pacific coast, who have been more or less isolated from direct contact with the research conducted by the Division of Bee Culture, have been given an opportunity to take up their problems directly and with little inconvenience.

E. L SECHRIST, Bureau of Entomology.

BEEF-CATTLE Finishing by Supplementing Pasture Is Increasing in Texas

Texas, with a colorful history as a beef-producing region, is now undergoing a rather noteworthy change in the tendency toward

finishing cattle by supplementing pasturage with other feeds.

Preparing cattle for market other than with pasturage is comparatively new to Texas stockmen. There is little cattle-feeding tradition in the State, and this is particularly true of those regions which have

been recently released from cattle-tick quarantine.

There must be recognized a distinction between farm feeding, which is a recent movement, and the feeding of cottonseed meal and cotton-seed hulls at or near cottonseed-oil mills, a practice which has been carried on for many years. Meal and hull feeding is of a sporadic type, however, in that few of the same men feed meal and hulls every year. It usually happens that a cattle owner for one reason or another conceives the idea of sending some of his cattle to an oil-mill feed lot for fattening. These cattle are often the culls of the herd and as such may include old cows with calves, cull yearlings, and some old bulls. At times uniform herds of good-quality aged steers are thus placed on feed, but as a general rule the cattle fed on meal and hulls are of poor quality.

Surveys Show More Cattle Fed

The movement toward feeding cattle on the farms of the State is only about 3 years old. A recent survey report by county agents in 88 counties indicated that 507 feeders were finishing 70,088 head of cattle,

of which 70 per cent were calves. A decided upward trend in the number of farmers who utilized home-grown feeds in finishing cattle during the feeding period of 1930-31 is shown in this report. A similar survey made the previous year showed feeding of cattle in only 50 counties, in which 211 feeders were finishing 40,000 head. Analysis of the 1929-30 report showed that more than half of the cattle were being fed by commercial feeders, mostly in the vicinity of Fort Worth, whereas the report for 1930-31 showed that three-fourths of the cattle were being fed

by farmers and ranchmen.

A study involving 60 cattle feeders in the central Texas blackland belt showed that of the 8,540 cattle on feed 51.2 per cent were calves, 38.5 per cent were yearlings, and 10.3 per cent were older cattle, including cows and 2 to 4 year old steers. Most of the calves fed were of good quality. Approximately 50 per cent of these calves, however, were sent to market unfinished and as such were resold as stockers and feed-Several factors contributed to this situation, one of which was lack of experience in feeding cattle for market. The financial results of the last two seasons of feeding have served to emphasize the necessity of low-cost gains.

Promising Feeding Systems

Feeding demonstrations involving the use of various roughages, grain sorghums, corn, and combinations of these feeds with cottonseed meal have resulted in well-finished cattle, when the cattle were fed a sufficient time. Two methods of producing marketable finished cattle in Texas give particular promise of being successful. One is feeding yearling cattle on sorghum silage and cottonseed meal These cattle may receive grain, in addition to silage and cottonseed meal, if their quality justifies the additional expense. The other method is creepfeeding calves to be marketed either as fat slaughter calves or, with additional feeding in the dry lot, to be marketed with more weight and

JOHN H. JONES, Bureau of Animal Industry.

EEF Cattle, if Vigorous, Stockmen in the northern Great Can Be Wintered on Range Plains have long been confronted with the problems of economical feeds and of methods of winter-

ing breeding cows. These have been subjects of research by the State experiment stations and the United States Department of Agriculture. Contributions have been made by these agencies concerning feed requirements and rations for feed-lot use, but informa-tion concerning wintering on the range is still very limited. The methods best adapted to any locality in this range country are largely controlled by severity of weather conditions, availability of grazing land, and the quantity of stored feed available.

The northern Great Plains comprise approximately 130,000,000 acres of land in central and eastern Montana, the western part of the Dakotas, and a small corner of northeastern Wyoming. This area is drained by the Missouri River and its tributaries. The soil of the region, with the exception of eroded badlands, is generally fertile. Rainfall is the limiting factor in range-grass and feed-crop production. The annual precipitation ranges from about 13.8 inches at Miles City,

Mont., to 16.8 inches at Ardmore, S. Dak.

The land types of the region consist of 54 per cent grazing land, 13 per cent grazing-forage land, 12 per cent farming-grazing land, 12 per cent farming land, 7 per cent national forest, and 2 per cent irrigated land. The total grazing land is approximately 74 per cent of the total acreage. Because of its location, climate, soil, and vegetation, this region is primarily adapted to grazing; most of the crops for winter feed must be derived from native vegetation or feed crops grown under semi-arid conditions. Summer droughts, with subsequent shortages of water and range grass for winter and summer use, occur from time to time, as do severe winters with deep snow. This is a region, therefore, where feed and water reserves must be stored for periods of shortage.

#### Older Animals Winter Best

Stockmen in this region use various methods of wintering cows, the choice being influenced by the resources of the ranch involved. Any method that will carry a cow in such a way that she can be turned on to spring range in a strong vigorous condition at a minimum outlay of feed and expense is satisfactory. Calves and yearlings do not winter so well on the range as do older animals. Breeding cows and mature steers that carry good flesh can be economically wintered on the range, but they will suffer loss in weight which, however, is regained later on summer grass. Cows from which calves have been weaned in October. and that carry good flesh when winter weather arrives, can lose from 75 to 150 pounds during the winter and still produce normal calves. This is about the weight loss to be expected under average conditions where cows are wintered either on the range without supplement or in the feed lot with straw. These cows require more attention and closer observation than cows or steers carried with a fair amount of supplemental feed. The owner must be able to recognize symptoms of weakness and should promptly move weak animals to a hospital lot where more abundant and nutritious feed is available. Cattle wintering on the range require daily attention to prevent death losses. Falls into deep washouts are common, and injuries occur more frequently on the range than in the feed lot.

#### Natural Shelter Desirable

Wintering breeding cows and mature steers on the range involves a number of problems which must be given careful consideration if satisfactory results are to be obtained. In the first place, grazing land selected for winter range should be protected from grazing during the previous summer season. This land should contain rough hills and draws for bed grounds and natural protection during storms. An adequate supply of water should be available either from streams or from tanks kept free from ice. Because of snow on the range, grazing cattle do not require water so frequently in winter as in summer, but they must not lack water. Salt should be put out near the water supply to induce liberal use of water. Winter range should be close to a winter feed supply in order that weak cows may be removed to the feed lot with as little trailing as possible. The area of range per cow required for a 5-month period should average from 10 to 40 acres, the area depending on the density of the sod, the growth of grass, and snowfall during the winter. Rough, broken-up ranges generally supply more winter grazing during periods of deep snow than flat, exposed areas. Snowplows can be used very effectively to uncover grass on level regions during periods of deep snow.

# Cottonseed Cake as a Range Supplement

Very satisfactory results have been obtained through the use of cottonseed cake fed, as a supplement, to cows on winter range. This supplement increases the winter cost, however, and its profitable use depends on the severity of the weather, condition of cattle, and quality of range forage. Nut-size cake, containing 43 per cent protein, is satisfactory where cattle are fed on the ground. A common and perhaps the most practical method of feeding the cake is to carry it to the range on a pack horse and feed cattle in small groups with as little movement of the cattle as possible. A measure of known capacity is valuable in obtaining an equal distribution of cake if the bunches of cattle are small. From 1 to 2 pounds of cake per head per day, or every other day, depending on the weather and condition of the cattle, is a common rate for feeding this concentrate. At the United States Range Livestock Experiment Station, Miles City, Mont., cows which were fed an average of 103 pounds of cake on the range during two mild winters (1929-30 and 1930-31) maintained their weight, whereas a similar group of cows on the range without cake lost an average of 27.9 pounds

### Range Wintering Results

The head of Hereford breeding cows at the same station was carried on the range and in the feed lot through four winters, from 1925 to 1929. The objects were to determine (1) the percentage of cows in a breeding herd which, under average conditions, can be wintered on the range, (2) the effect of the loss in weight during the winter, as affecting subsequent gains on grass the following summer, and (3) the effect on the calf crop as shown by the number and weight at weaning time. This work was carried out along practical lines; strong cows were kept on the range all winter, and weak individuals were brought to the feed lot at different periods during the winter. Weak cows were kept in a hospital lot for a short period after removal from the range until they recuperated and then were placed with the regular feed-lot group, where straw and cottonseed cake were the principal feeds. A limited quantity of alfalfa hay was fed with straw during one winter and a heavy feed of corn silage during a second winter. Toward the close of one winter cottonseed cake was fed for 30 days on the range.

The range utilized during the winter was rough but well supplied with forage and with naturally protected bed grounds. It had been protected from grazing during the preceding summer season. The area, approximately 10,000 acres, greatly exceeded the grazing requirements of the cattle, as they trailed around constantly. Range forage consisted of western wheatgrass, grama grass, and needle grass. Water was pumped by windmills and stored in tanks, which were kept partly

free from ice by the use of tank heaters.

Cows on the range all winter suffered an average loss in weight of 80.8 pounds, which was regained before the calves were weaned the next October. These cows were mature; only a small number were young or very old cows. This range-all-winter group comprised 53 per cent of the entire breeding herd through a 4-year period.

Cows on the range and in the feed lot suffered an average rangeweight loss of 77.3 pounds. They gained 47.3 pounds in the feed lot and, therefore, suffered an average net loss of 30 pounds. This loss was also regained by the time the calves were weaned in October. The range-and-feed-lot group comprised 47 per cent of the herd. During the winter this group was on the range 60 per cent of the time and in the feed lot 40 per cent of the time. The cows fed during the entire winter represented approximately 20 per cent of the entire herd.

The average weaning weight of the 408 calves produced through this 4-year study was 379.3 pounds. Calves produced by cows carried on the range all winter weighed 4.4 pounds more than this average, whereas calves produced by cows on the range and in the feed lot weighed 5.4 pounds less than the average.

# Range Wintering Not Harmful to Breeding Cows

From 50 to 75 per cent of the cows in a breeding herd in good physical condition in the fall can be wintered on the range, under average weather conditions, when satisfactory range is available and good management practices are followed. Wintering on the range does not injure breeding cows and permits the accumulation of feed reserves for severe seasons. The conditions at the Miles City station with regard to climate and range are typical of the northern Great Plains, and results obtained in winter range work with breeding cows are generally applicable to northern Great Plains conditions.

A. L. Baker, Bureau of Animal Industry.

BEEF-COW Herd, When Properly Managed, Is Aid to Farm Income

The production of beef cattle is an enterprise that fits in well with a program of sound farm economy. This is especially true of a herd of beef cows

which can be pastured to advantage during the spring and summer on land which is too rough for crop production or, for other reasons, is unsuited to that use. Later the cows will make effective use of such aftermath as stalk fields. Feeds of that class cost much less than hay and grain and save labor expense, particularly if the grazing areas are fenced.

Of course some labor will occasionally be needed, as for example, in making certain that water and salt are available to the herd, possibly in assisting at calving time, and in castrating when the calves are 3 or 4 months old. The practice of creep feeding the calves when they are on pasture with their dams will also periodically require a small amount of labor in filling the self-feeder. Although essential, these tasks are not heavy and need not involve the employment of extra farm helpers.

# Winter Maintenance Cost Important

If the beef-cow herd is to increase the farm income materially, it is essential that cost of the winter maintenance be kept at a minimum. In fact, on most farms the winter season affords probably the greatest opportunity for feeding the herd in a manner that will insure low costs for the entire year. Excessive increase in weight is unnecessary and unprofitable. Nevertheless, it is important that the cows and bull have enough feed to maintain their condition and thrifty appearance throughout the winter months.

Experimental results show that a winter gain had best not be over 50 to 75 pounds and that even a loss in weight of 25 to 40 pounds a head is not objectionable, provided the cows remain in thrifty condition.

A ration composed of silage, cottonseed meal or other protein concentrate, and straw will effectively maintain the herd at relatively low cost, but requires the purchase of the protein concentrate. However, a combination of corn silage, soybean hay, and wheat straw, all homegrown products, will be equally satisfactory. Shock corn, mixed hay, and straw may be used if silage is lacking, but these feeds are likely to

prove less economical than those already mentioned.

The United States Department of Agriculture, in cooperation with the West Virginia Agricultural Experiment Station, has conducted experiments in wintering herds of cows in West Virginia. The results show a difference in the total cost of wintering a breeding herd of as much as one-third, between two of the rations fed, even when minimum quantities needed for maintenance were supplied. A careful consideration of feed combinations is extremely important if the herd is to be managed economically.

# Creep-Fed Calves Develop Rapidly

To obtain such economy, maximum use of native and other pasturage in the spring, summer, and fall must be made. The calves may be creep-fed to advantage while on pasture with their dams, a practice which should increase the weight of each calf about 100 pounds by weaning time as well as develop a greater degree of finish by the time it is ready for market.

Beef cattle play a part in conserving soil fertility. Feeding homeraised grain, hay, and roughage helps to prevent the loss of fertility that would otherwise result from the removal of soil nutrients in the

form of cash crops.

E. W. McComas, Bureau of Animal Industry.

BEEF Heifers Compare Favorably with Steers in Meat Experiments

As meat animals, heifers usually sell at a lower price per hundred pounds than do steers of similar grade and weight. The principal reasons advanced for this

price discrimination concern relative finish or fatness, the claim that heifer carcasses tend to be excessively fat or wasty being widely made. This differential directly affects the producer when he disposes of young females not required for breeding purposes and, considering the large number of heifers marketed in the United States, it amounts to a

very large sum of money each year.

Cooperative experiments for the study of this problem have been conducted recently as a part of the national project, cooperative meat investigations. The institutions participating in these experiments were the Arkansas Agricultural and Mechanical College; the agricultural experiment stations of Arkansas, Colorado, Michigan, Missouri, Mississippi, and Ohio; Sni-a-Bar Farms at Grain Valley, Mo.; and the Bureaus of Animal Industry, Agricultural Economics, and Home Economics of the United States Department of Agriculture.

### Fatness or Finish in Relation to Weight

In each of 12 experiments good beef-type steer and open (unbred) heifer calves of similar age, breeding, and previous feeding and management were fattened on like feeds and slaughtered at the same time after the same length of feeding period. The experiments included a total of 140 steers and 137 heifers. All were graded individually as feeders, as slaughter cattle, and as beef carcasses by committees of three men representing the State experiment station concerned and the department. Of the various characteristics of each individual so graded only three carcass characteristics are considered here. These are (1) amount of kidney and crotch fat, (2) thickness of external fat, and (3) amount of intermuscular fat. All are important indications of finish.

A carcass-grading chart adopted by the cooperators in the national project was used in the work. The chart provides for recognition of nine major degrees of finish, with three subdivisions of each. Table 1 gives descriptions of the different degrees of finish with the corresponding market grade indicated in each instance.

Table 1.—Description of different degrees of finish with reference to kidney and crotch fat, external fat, and intermuscular fat of beef careass

Kidney and crotch fit	External fat	Intermuscular fat	Market grade of carcass
Extreme amount Unusual amount Large amount Moderate amount Slightly deficient Moderately deficient Very deficient Extremely deficient	Extremely thick. Unusually thick. Very thick. Thick. Moderately thick. Slightly thin. Thin. Very thin. Extremely thin.	Extremely abundant Unusually abundant Abundant Noderately abundant Slightly deficient Deficient Understely deficient Very deficient Extremely deficient	Good. Choice Prime Choice Good. Medium Common. Cutter Low Cutter.

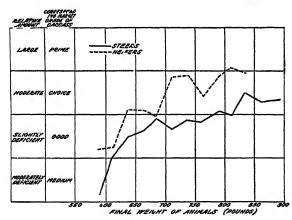


FIGURE 4 —Quantity of kidney and crotch fat in relation to final weight for well-bred steers and heifers

It will be noted in the classification that only seven market grades of carcass are represented, ranging from Prime down to Low Cutter. When the finish exceeded "very thick," with reference to external fat as an example, it was graded down to Choice or Good.

The relation between final feed-lot weight and amount of kidney and crotch fat is shown in Figure 4.

In general, at all weights the heifers exceeded the steers in amount of kidney and crotch fat, a rather wide difference appearing between the sexes at a majority of the weights. It is of particular interest to note that the heifers reached a given degree of finish at a distinctly

lighter weight than the steers. For example, the heifers reached the degree of finish characterized by "moderate amount" of kidney and crotch fat at approximately 650 pounds weight, the steers at approximately 790 pounds. At about 800 pounds the heifers had reached the range represented by "large amount." No steers reached this degree of finish although some were fed to a weight of approximately 900 pounds.

As to the relation between final feed-lot weight and thickness of external fat (fig. 5) it appears that up to about 625 pounds weight there was very little difference between the sexes. At heavier weights, however, there was greater difference, with the heifers consistently showing the thicker fat. In external fat the heifers reached the degree of finish, "thick," at about 700 pounds weight, whereas the steers did not attain this finish until they weighed approximately 835 pounds. Neither sex in these experiments reached the degree of finish, "very thick," in external fat.

A longer fattening period with greater gain would have been necessary to accomplish this.

Final feed-lot weight and amount of intermuscular fat (fig. 6) showed much the same trends and differences. The heifers and steers reached the degree of finish, "moderately abundant," at practically the same

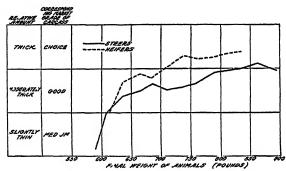


FIGURE 5 —Thickness of external fat in relation to final weight for well-bred steers and heifers

weights as those at which they had reached the corresponding degree of external fat, or at about 700 pounds and 835 pounds, respectively. Neither steers nor heifers acquired enough finish to be judged as having "abundant" intermuscular fat.

### Dressing Percentages

The weight of the dressed carcass of a meat animal in relation to the live weight is always an important consideration. The relationship, or yield, is commonly expressed in terms of dressing percentage. With cattle, small differences in dressing percentage represent relatively large differences in pounds, due to the rather heavy weights commonly involved.

In these experiments 56 representative steers and 54 representative heifers were slaughtered under carefully controlled conditions and dressing percentages were determined. In 11 of the 12 experiments the representative heifers were lighter in weight at the close of the feeding period than the steers. The average difference for the 12 experiments was 76 pounds, the steers averaging 780 pounds in weight and the heifers 704 pounds.

In 7 of the 12 experiments the steers exceeded the heifers in dressing percentage. In the five other cases the heifers exceeded the steers. The average difference for the 12 experiments was so slight as to appear of

no significance. In general the heifers dressed fully as high in percentage as the steers, although weighing an average of 76 pounds less than the steers at the end of the feeding period. At common final weights the heifers tended to yield a slightly higher percentage of carcass than the steers.

### Palatability of the Cooked Meat

To the consumer the palatability of cooked meat is always of direct interest; to the producer, packer, and retailer it is also important, though less directly so. To compare the palatability of the meat of the sexes, standard rib cuts were taken from the same 56 steers and 54 heifers and roasted by a strictly uniform method. The department meat-judging committee, consisting of five persons, graded the cooked

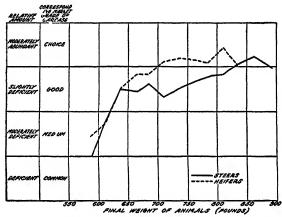


FIGURE 6 —Amount of intermuscular fat in relation to final weight for well-bred steers and heifers

meat for tenderness, quality and quantity of juice, texture, intensity and desirability of aroma, flavor of lean, and flavor of fat.

The result showed no significant preference for the cooked meat of one sex over that of the other. The data justify no practical distinction between the sexes with respect to palatability of the meat.

In general the experiments suggest that if a moderate quantity of kidney and crotch

fat and of intermuscular fat, together with a thick covering of external fat, is desired in the carcass the typical heifer should be slaughtered at about 725 pounds weight, the steer at about 850 pounds. The heifers tended to yield a slightly higher percentage of carcass than the steers at common final weights. No practical difference in palatability was shown. From these results it appears that up to the point where the heifer becomes excessively fat, price discrimination against her is not justified.

O. G. HANKINS, Bureau of Animal Industry.

BEET Leaf Hoppers' Origin Important in Control and in Prediction of Attack

The beet leaf hopper, Eutettix tenellus Baker, migrates long distances from its desert breeding grounds to the cultivated areas,

where it transmits the disease commonly known as curly top to beets, tomatoes, beans, and other crops.

An effort has been made to determine which of the many breeding areas in the western part of the United States are responsible for infesting the various sugar-beet growing sections, particularly in Colorado, Utah, and Idaho. The general source of the bugs infesting the large

California beet-growing area is already quite well known, although much remains to be determined about the details of the pest's flight and the relative importance of various portions of the breeding area. This information is essential before the possibilities of reducing populations in the breeding areas, either through reduction of the host plant or by direct action against the insects, can be determined and accurate estimates of probable injury can be made.

The study of breeding areas from which this pest infests the three States named has brought forth some very definite information on the distance of flight which has heretofore been lacking as far as the Mountain States are concerned, but which tends to confirm some of the findings of earlier workers regarding distances of flight in other regions. During the spring of 1931 flights of 250 to 300 miles into the central Utah sugar-beet area were made. These flights, although reaching their maximum distance in a week or 10 days, apparently consisted of a series of short hops, by which the infestation was carried gradually farther from the breeding area.

### Methods of Determining Source and Movement of Insects

Two methods have been used in checking the direction, intensity, and speed of these movements and in locating the source of the migrating insects. One method is illustrated by the study of the movements in Utah in 1931.

There are at least three possible sources of the leaf hoppers that infest the beet-growing region from the Great Salt Lake south in Utah, as indicated by areas where Eutettix is known to breed in large numbers. One of these is to the south in Utah, Nevada, and Arizona; a second to the west in western Nevada; and a third in the San Rafael and adjoining deserts in eastern Utah. Small breeding areas occurring around the Great Salt Lake can be disregarded in this discussion because, as the insects matured much later, only the young, unwinged stages of the spring broad were present at the time of the first infestation. The method of investigation involved ascertaining the distribution of the leaf hopper previous to flight, detecting and tracing the daily progress of the first movements, and determining the size of populations along routes leading toward the suspected breeding areas. Three routes were selected, one leading toward the western Nevada territory, a second toward that in southern Utah, and a third toward the eastern Utah section; and careful population studies were made along them before the first insect flights. Previous experience had indicated that populations of the leaf hopper on favorable hosts become higher as the source of the insects is approached. Early surveys along these dispersal routes indicated an almost total absence of the leaf hopper, the few present being dark overwintering forms in contrast to the light-colored spring forms which are almost exclusively present in spring dispersal flights. The first influx of the leaf hopper was discovered at the southern end of the beet-growing area at Richfield, about 170 miles south of Salt Lake City. The men assigned to the various routes were notified by wire and each possible route of movement was carefully The results were negative except for the route leading toward the southern Utah and Nevada breeding areas, where the population increased with progress southward. One observer, following the daily progress of the infestation northward, found that the sugar-beet area around Great Salt Lake was reached on the fifth day after the bugs were

discovered in Richfield.

A second method of determining the source of the flight and the size of the movement has been utilized at Twin Falls, Idaho, where the beet-growing section is rather closely surrounded on all sides by at least potential breeding areas. This has involved the use of a trap (fig. 7) devised for intercepting the insects in flight. The insects are screened out of the air passing through the trap and are concentrated and killed in a cyanide jar attached to the bottom. These traps are mounted on poles at heights of 10 to 50 feet and placed around the beet area in such a way as to intercept flight from all directions.



l murl 7 —Traps used in studies of leaf-hopper dispersal at Twin Falls, Idaho

Counts of the catches at regular intervals indicate the intensity of the flight throughout the season, and the distribution at various trap stations shows the direction from which the insects are coming. These data, when combined with data on the distribution of infestation in cultivated and breeding areas, point to the source of the leaf hoppers.

# The Problem of Long-Range Prediction

This work in Idaho has emphasized the difference in source of leafhopper infestation from year to year and has brought out some of the difficulties in long-range prediction of leaf-hopper abundance. The 1930 infestation came mainly from one area, the 1931 from another. Although the 1930 contributing area had fairly high early populations in 1931, these were practically climinated by drought early in May and no bugs were brought to maturity for the spring flight. In other years undoubtedly both areas have contributed. The relative importance

of the various breeding areas has probably varied from year to year according to initial populations, winter severity, precipitation during the fall and spring months, and host-plant development. Except for the spring rainfall, all these factors can be determined before spring development. Spring rainfall and temperatures occasionally affect the final populations in a given area to an extreme degree, even to the point of wiping them out almost completely, as this year in the one area which has been mentioned. Under these conditions accurate analysis of the results in any year is closely associated with the correct estimate of the relative number of leaf hoppers contributed by each of the possible sources. Early estimates of probable abundance must take into consideration local conditions in the breeding areas of highest populations and their previous contribution to the spring flight under comparable conditions.

Accurate determination of the exact source of the infestation for each year is thus a problem of major importance, and its solution will contribute much to an understanding of factors involved in determining the size of the flight and the consequent amount of injury.

P. N. Annand and E. W. Davis,
Bureau of Entomology.

BERRY Breeders Seek New Varieties Adapted to Specific Purposes

In breeding new berry varieties it is essential to recognize the desirable qualities as well as the weaknesses of the commercial sorts now grown in

the regions of the country for which the new varieties are intended. The use now made of each variety in the home, in the restaurant, and in industry must also be considered. As far as possible new varieties should possess the desirable qualities of the present commercial sorts in the various regions and the qualities desired by industries, and should not have the weaknesses of present varieties. Now uses

may be found for varieties with new qualities.

Berry breeding by the United States Department of Agriculture is directed to specific objectives, as, for example, producing a leaf-scorch resistant strawberry for the South; a strawberry variety with fruit resistant to the rots for humid regions; a mildew-resistant productive sort of the Clark type for the Hood River section; varieties that do not turn bitter during the harvesting season for regions having hot, dry weather; varieties with tough skins for long-distance shipments; deep-red acid varieties for canning; light-red tart sorts for preserving; and sweet, highly flayored varieties for eating out of hand. Similarly, rasp-berry breeding is directed toward obtaining better preserving, canning, and shipping sorts, and developing varieties for the Southern States through utilizing foreign species. In blackberry breeding emphasis is being placed on breeding for thornless sorts, for firm berries with high flavor, and for hardy varieties with the desirable flavor of the Logan and the Young.

Usually the desirable qualities in any two varieties of strawberry may be combined in a new variety if a sufficiently large number of crosses are made. The seedlings resulting from a cross of two sorts usually form a series grading almost imperceptibly from one parent to the other. In raspherry and blackberry breeding the results are usually what would be expected in Mendelian inheritance. The most difficult part of all berry breeding lies in recognizing the best among a large

number of seedlings.

# The Ettersburg 121 Strawberry

The rapidity with which industries adopt varieties better adapted to specific uses is best illustrated by the case of the Ettersburg 121 strawberry. This variety was introduced about 1913. Its superior canning qualities were soon recognized, and it became prominent in Oregon about the time of the World War. At present most of the strawberries canned in the United States are produced in the Willamette Valley of Oregon because it is there that profitable crops of the Ettersburg 121 variety can be produced. The Cuthbert red raspberry has been found the best sort for canning and jam making, and the raspberry-canning

and frozen-packing industry has centered largely in western Oregon and Washington, where the Cuthbert variety is most extensively raised.

Though raised extensively for canning, the Ettersburg 121 strawberry has not been found to be well adapted to other purposes. Partly for this reason and partly because it produces well only in a few areas, it has not occupied an important place in the strawberry industry. variety adapted to more conditions than the Ettersburg 121 and to other uses than canning would be of greater value. To this end both the Oregon State Experiment Station and the United States Department of Agriculture, by crossing varieties of known canning qualities with other sorts, have originated and introduced excellent canning sorts, the Corvallis and the Redheart, respectively. These varieties, however, are more than just canning sorts. The Corvallis is also an excellent fresh table berry, being one of the highest flavored of all strawberries. The Redheart, too, is an excellent table berry, a good long-distance shipper, and has much wider adaptation than the Ettersburg 121 or the Corvallis, succeeding fairly well even in the Northeast on rich soils.

#### Varieties Introduced in the East

For the region extending from New Jersey to Georgia the Blakemore strawberry has been introduced by the Department of Agriculture both as a general market berry and also as a preserving sort of superior color, texture, flavor, and pectin content. During the winter of 1931–32 cooperating nurseries and the North Carolina Coastal Plain Branch Station at Willard are introducing two other new sorts, the Bellmar and the Southland. The Bellmar is being introduced as a general market sort believed to be superior to the Howard 17 (Premier) for the New Jersey to Maryland region, and the Southland as a home-

garden sort of high quality for Southern States.

It is doubtful whether present varieties have all the desirable qualities that might be found in wild berries. Therefore selections of wild berries of all kinds are being made and put under cultivation for comparison and crossing with cultivated varieties. A few years ago an explorer of the Department of Agriculture went into the highlands of the Andes Mountains of South America for a strawberry grown there; another explorer sent back a wild strawberry from Kashmir, northern India; still another found a wild one in Manchuria; and other explorers have sent in strawberries from the tops of the mountains of Taiwan (Formosa) and of the Hawaiian Islands. With the help of forest rangers, selected wild strawberries have been obtained from many parts of the western United States. Through the cooperation of the Oregon State Experiment Station and the United States Forest Service in Alaska many selections of the beach strawberry of the Pacific coast are being used in breeding. Many other persons and agencies have also assisted in collecting superior wild forms. It is hoped that greater resistance to frost and to drought, as well as more vigorous growth through the short days of winter, may be obtained by the use of such wild sorts for breeding. The finest wild blackberries, dewberries, currants, gooseberries, and shadblow (Juneberries or service berries) to be found are also being collected for use in breeding.

GEORGE M. DARROW and GEORGE F. WALDO,

Bureau of Plant Industry.

BIG Trees, Relic of an Ancient Flora, now Found Only in Sierra Nevadas

The hig tree, Sequoia Washingtoniana, greatest and oldest of living things, grows in the very heart of the beautifully timbered Sierra Ne-

vadas. Relic of an ancient flora, it is now found only in the Sierras in a well defined zone and at an elevation of approximately 5,000 feet. Its cousin, the redwood, Sequoia semperciens, occurs only in a narrow strip along the Pacific coast. These species, confined to California, are the only ones left of a dozen or more which once spread over North Amer-

ica, Europe, and Asia.

Traveling easterly from the great valley of California into the Sierras, one goes from grassy foothills to thickets of brush and oak woodlands, and gradually climbs into the ponderosa pine belt. Above this are the heaviest and most valuable stands of mixed coniferous timber in the Sierras. Big trees like to associate with other Sierra species, and within this zone they occur in isolated groves. Above the foothills the terrain gradually takes on a more definite form with high level ridges and deep sharp canyons. The tributaries of these main canyons, which become less rugged near their heads, often terminate in shallow grassy basins where deep, rich, moist soils prevail. In these sheltered

valleys the trees thrive.

The widely separated groves of big trees extend along the west slopes of the Sierras from the Forest Hill Divide group of five living and two down trees in the Tahoe National Forest, to Deer Creek Grove of 300 trees east of Porterville in the Sequoia National Forest. There are in all approximately 70 groves, each containing from 5 to 1,000 trees over 5 feet in diameter breast high. Southerly from the Tahoe group at a distance of 60 miles and opposite Stockton in the San Joaquin Valley lie the North Calaveras and South Calaveras groves containing 158 and 946 big trees, respectively, over 1 foot in diameter, 6 feet above the ground. Forty miles southward in the Yosemite National Park is the Tuolumne grove with 20 trees and the Merced grove with 40. Within another 20 miles is the Mariposa grove with the Speckerman and Fresno groves near by. South 40 miles is the isolated McKinley grove of 160 trees. There is a 15-mile gap between this grove and the Kings River. Between the Kings and Kern Rivers, the big trees are found in greatest abundance; here in a distance of 60 miles there are approximately 50 groves. Here are found Sequoias 25 feet in diameter breast high, containing upwards of 500,000 board feet, and probably more than 3,000 years old. The most imposing big trees are within the General Grant and Sequoia National Parks, the latter containing the best-known grove, the Giant Forest.

# 964 Big Trees Within 415-Acre Area

When the United States acquired the privately owned South Calaveras grove in the Stanislaus National Forest, the Forest Service made a detailed estimate of the pine, fir, and cedar within the area and measured each big tree accurately. In an area of 415 acres there were 964 big trees, 12 inches and over in diameter 6 feet above the ground, and many thickets of reproduction. There is also a heavy intermingling stand of other conifers, young and old.

The largest and tallest big trees are close to Big Tree Creek. The Louis Agassiz, the largest tree in the grove, is 30 feet in diameter at



FIGURE 5 —The Louis Agassiz, largest of the big

king of the world's forest trees.

eter 6 feet above the ground, and 18 feet 1 inch in diameter 19 feet above the ground. Its height is 250 feet. (Fig. 8) The tallest tree in the grove is 330 feet high. The greatest volume of lumber is in the Governor Stoneman tree, which contains 179,000 board feet, or sufficient lumber to build twenty 5-room bungalows. larger limbs, 100 feet above the ground, are 6 feet in diameter. Big trees occur here singly and in groups of from 2 to 6 and are well distributed over the entire area. Memorial plaques on many of them are reminiscent of botanical and carlier American history.

its base, 23 feet 6 inches in diam-

On entering the big-tree groves one is struck by the massive columns of strength and beauty, the bases fluted to support the great weights; the tapering boles clothed with a soft, cinnamon-red, deeply furrowed bark; and the heavily foliaged, bluish green crown lifting itself 100 feet above the surrounding forest. Towering above all its fellows, the big tree is indeed the

OSCAR EVANS, Forest Service.

IRD Refuges Can Be Made on Every Farm and Are Valuable Farmers, more than any other group, will be interested in the establishment and maintenance of effective bird refuges, for the welfare of crops and the

commercial success of the farm are intimately related to the numbers and kinds of birds present and to their economic tendencies. Against certain more-or-less injurious species control measures are sometimes necessary; but the great majority of birds are from slightly to almost exclusively beneficial in their relations to the farm, and thus to man. The useful species merit the fullest protection and should be encouraged in every possible way.

The economic value of birds lies chiefly in their destruction of injurious insects. Leading an active life, they require much food and are the most ravenous enemies of insect pests. The various groups of birds differ so much in habits that they feed upon practically all groups of insects; hardly an agricultural pest escapes their attacks. The alfalfa weevil has 50 different bird enemies; the army worm, 43; billbugs, 110; the cotton-boll weevil, 66; the brown-tail moth, 31; chestnut weevils, 85; the chinch bug, 29; clover-root borers, 94; the clover weevil, 48; the codling moth, 36; the cotton worm, 41; cutworms, 98; the forest tent caterpillar, 32; the gypsy moth, 46; horseflies, 49; leaf hoppers, 175; the orchard tent caterpillar, 43; the potato beetle, 34; the rice weevil, 22; the 12-spotted cucumber beetle, 42; white grubs, 95; and

wireworms, 205.

In feeding, birds not only take a great variety of insect pests, but frequently destroy them in very large numbers. Often more than 100 individuals are devoured at a meal, and if the insects are small the number sometimes reaches several thousand. It is not surprising that occasionally birds with such appetites entirely destroy certain insects locally. A number of cases are known in which trees, garden crops, and even farm fields have been completely freed of insect pests by birds. On a 200-acre farm in North Carolina it was found that birds were destroying green bugs, or wheat aphids, at the rate of 1,000,000 a day.

A particular farm may not have so large a bird population as is desired, and therefore may not be deriving the benefit from birds that is its due. The most effective means of increasing the number of birds on the farm is protection, and such protection in its best sense is

afforded by making the farm a bird refuge.

### Cooperation with Various Agencies

Bird refuges on farms have been most successful when established and maintained on a cooperative plan by the landowner or landowners and a State game commission, an Audubon society, a local bird club, or a school. The owner agrees to the use of the land and acts as warden, and the other party to the contract furnishes and places posters, bird houses, and feeding stations, or even stocks the refuge, as in reservations for game birds. The beneficial effect upon trespass problems of establishing a bird refuge is a great advantage to the farmer. State laws authorizing game wardens to proceed against trespassers on bird reservations greatly increase the effectiveness of private and cooperative bird refuges.

The cooperative bird refuge has been tried in many States as a means of establishing colonies of game birds, such as pheasants, and the plan has invariably proved popular and successful. As a method of protecting insectivorous birds it has been put into practice by schools, local bird clubs, and Audubon societies in New Hampshire, Connecticut, Illinois, and Minnesota, at least, and has been found

satisfactory and effective.

It is not meant to imply, by the foregoing, that refuges established by individuals are impracticable—far from it. After all, interest in the welfare of birds is the underlying factor most essential to success, and, that granted, the creation of a refuge on any farm is sure to be attended by some degree of success. The more farms participating in the movement the better it will be not only for birds but for the farms.

In making a bird refuge of a farm, attention should be given primarily to cover, food supply, and water. Modern clean farming leaves slight accommodations for nesting birds. The old-time shrubby fence row or hedge offered food, shelter, and nesting places, compared with which the present-day brushless wire constructions are of no value as attractions to birds. If birds are desired, either some shrubby growth should be permitted along fences, or the deficiency should be made up by planting suitable fruit-producing and other shrubs in gullies, on ditch banks, and in various odd corners.

#### Wild Fruits That Birds Like

Planting should always take into account the food-producing qualities of the material used. Among the wild fruits most frequently patronized by birds are elderberry, blackberry, mulberry, dogwood, wild grape, sumac, cherry, holly, blueberry, pokeberry, and service berry. Some of these plants often can be spared in thinning or clearing operations, and most of them can be planted to advantage for ornament as well as for their bird-food value.

Along with the development of clean farming, the character of tree growth on farms has changed; there are not so many old trees as formerly, and in consequence there are fewer sites for the nests of hole-inhabiting birds. This deficiency can be made up by supplying bird boxes, a desirable step anyway if we are to preserve a fair population of the cavity-nesting birds, some of which are among the most useful.

That water for drinking and bathing is required goes without saying, and if the wants of birds in this respect are not filled by natural streams

or pools, artificial provision should be made.

Simple ways of meeting the requirements of birds for water, for nesting sites, for shelter, and for food are set forth in a series of Government publications, any of which may be obtained from the Department of Agriculture upon application. These are the following: How to Attract Birds in the Northeastern United States (Farmers' Bulletin 621), How to Attract Birds in the Northwestern United States (Farmers' Bulletin 760), How to Attract Birds in the Middle Atlantic States (Farmers' Bulletin 844), How to Attract Birds in the East Central States (Farmers' Bulletin 912), Homes for Birds (Farmers' Bulletin 1456), Local Bird Refuges (Farmers' Bulletin 1644), and Gourds for Bird Houses and Other Purposes (Leaflet 36). There can also be had from the Bureau of Biological Survey a list of publications, obtainable from other sources, on attracting birds (Bi-159), and a list of dealers in devices for attracting birds (Bi-160).

W. L. McAter, Bureau of Biological Survey

BUTTER Stored in 1-Pound Prints Keeps as Well as if Stored in 64-Pound Tubs

Butter for storage is usually packed in tubs or boxes which hold about 64 pounds. Circumstances sometimes make it desirable to store the

butter in 1 or 4-pound prints. In this form there is a much greater surface area per unit weight of product than when the butter is in a solid mass.

Observations have been made on the keeping quality and loss in

weight of butter stored in 1-pound prints.

In 1928 the Navy Department stored sweet-cream butter in 1-pound prints, wrapped in brine-soaked parchment paper but not placed in cartons. The butter was made by creameries in Minnesota and Wisconsin, shipped to Minneapolis in tubs and there made into 1-pound prints with a power-operated printer. The butter was from 3 to 10 days old when printed. It was then shipped to San Francisco in refrigerator freight cars and placed in storage at about 0° F. In February, when the butter was 7 to 8 months old, it was scored by a competent butter judge. The butter represented 18 churnings from three creameries. One of the churnings scored 91, eight of them 92, and nine of them 93.

For the last eight years a creamery in Pennsylvania has stored 20,000 to 25,000 pounds of print butter annually in a commercial cold-storage warehouse in Washington, D. C. The butter was made from unripened, pasteurized sweet cream and was of very fine quality. It was printed at the creamery with a 1-pound hand printer, placed in dry parchment wrappers and paraffined cartons, and packed in wooden boxes of 50 pounds capacity. It was shipped by express to Washington and stored at a temperature of approximately 0° F. Some of it was held as long as seven months. Upon removal from storage it was sold to people who were accustomed to getting fresh butter from that creamery. A critical examination of the butter showed a slight surface taint but during the eight years that the storage butter has been used the quality has been satisfactory to the consumers. This indicates that the surface taint was so slight that it escaped the consumers' attention.

### Prints Weighed Individually

In order to determine loss in weight during storage nine hundred and fifty 1-pound prints were weighed individually at the creamery and weighed again after six months' storage at 0° F. The butter for this investigation was taken from regular churnings at the creamery, and was printed and packed as described above. It was shipped to a cold-storage warehouse in Washington, D. C., where it was held at about 0° for six months. The loss in weight of individual prints varied from 0 to ½ ounce. Some of the greater losses were probably due to the presence of unincorporated water, that is, water in large drops which escaped after the first weighing.

The loss in weight was affected but slightly by the position of the print in the case. The outside prints lost, on an average, 1/40 ounce per

print more than the inside prints.

The manufacturing data at the creamery showed that the butter from three churnings was firm while that from two was soft. The soft butter lost ½ ounce per pound print more than the firm butter.

Among the nine hundred and fifty 1-pound prints only three lost as much as ¼ ounce. The soft butter lost an average of ½ ounce and the firm butter ½ ounce per pound. The average loss for all prints was a trifle less than ½ ounce per 1-pound print. This is at the rate of nearly 8 ounces on 64 pounds, which is the amount usually allowed for shrinkage when packing 64-pound tubs.

These observations indicate that sweet-cream butter in 1-pound prints may be held in cold storage for at least seven months without material deterioration in flavor and that, when the moisture is well incorporated in the butter, the shrinkage should not exceed % ounce

per 1-pound print.

WILLIAM WHITE, Bureau of Dairy Industry.

ABBAGE Variety Jersey
Queen Adds Early Strain
Resistant to Yellows

The yellows disease of cabbage is one of the most hazardous diseases of this crop except in those northern sections such as New York State and

northern Wisconsin where the climate is too cool for its development. It is caused by a persistent fungus (Fusarium conglutinans), which, when once introduced, remains indefinitely in the soil. The only suc-



FIGURE 9 —The plot of severely infested soil where cabbage scleetions are tested for resistance to the yellows disease. The two rows at the right were planted with a susceptible variety of cabbage, nearly all plants succumbed to the disease. At the left are two pure lines of Jersey Queen which resisted the disease perfectly

cessful control of this disease is through the development of varieties of cabbage that resist the parasite. Since 1912 several resistant varieties have been introduced, among which are two late varieties, Wisconsin

TIGURE 10—A mature head of Jersey Queen cabbage The shape of head is similar in every respect to that of the mother variety, Jersey Wakefield

Hollander and Wisconsin All Seasons, and three midseason varieties, Marion Market, Globe, and All Head Select.

Until recently a resistant strain of early-maturing type has not been available. However, there has now been perfected a resistant strain from the Early Jersey Wakefield variety, which is popular as an early-market and home-garden cabbage. To distinguish this new strain from the mother variety it has been named Jersey Queen.

Jersey Wakefield is very susceptible to yellows. In badly diseased soil 95 per cent of the plants commonly succumb. It was from the small percentage of survivors that the new variety, Jersey Queen, was developed. By selection from such survivors and reselection over a period of years were developed pure lines which completely withstood the disease on soil so

severely infested with the yellows parasite that most plants of a susceptible variety succumbed. (Fig. 9.) From these pure lines many plants were eliminated because of their failure to correspond closely to the Jersey Wakefield in earliness, type of head, and other characters. One of these pure lines was chosen after three years of close comparison with the mother variety. This line was made the basis for multiplication.

The new variety is very similar in type to the better strains of Jersey Wakefield, with which it has been compared. It matures just as carly and as uniformly as the earliest strains of the mother variety. The average weight per head is equal to that of the early strains of Jersey Wakefield. The characteristic pointed head is maintained (fig. 10),

and the core is inclined to be somewhat shorter.

Seed of this new variety is now being made available through the seed trade. Inquiries regarding sources of supply may be directed to the Department of Agriculture.

J. C. WALKER, Bureau of Plant Industry.

AMPS in the National Forests Attract Farm Folk Seeking Recreation Increasing use of the conveniently located national forests of Oregon and Washington is being made by people from the agricultural lands of the in-

terior where summer temperatures make the lowlands uncomfortable. Summer sun on fallow and stubble, quivering heat on orchard and field, are more bearable when an ever-extending road system makes it possible to reach the forest-bordered streams or lakes of the national forest within a few hours.



Figure 11 -An attractive and inexpensive summer home in an Oregon national forest

The Forest Service has anticipated this recreational use and has carefully planned for it by setting aside tracts of land along streams, lakes, and highways for the use of the public. Each person can find somewhere within reach of his home a place in the national forests which will exactly meet his need as a refuge from summer heat. He

may wish to put up his tent on one of the many free public camp grounds, where wood and water are to be had for the taking. He may desire to live at one of the many resorts, a cabin camp, or a hotel. He may wish to secure a permit and build a cabin where he can be alone, or perhaps the younger members of the family may join one of the numerous organizations which operate summer camps on the national

forests. (Fig. 11)

The free public camp grounds meet the greatest demand since their use involves a minimum of effort and expense. In fact, the only cost is that of getting to the camp and back home. Restrictions are few, pertaining only to fire and sanitation. These free camp grounds are laid out in desirable locations, and in many cases simple improvements such as water systems, cheap tables, and sanitary conveniences are provided. If actual use may be taken as a measure of their service, these national-forest camps are filling a clearly expressed need as refuges from the dusty heat of the lower farming lands.

F. V. Horton, Forest Service.

ATTLE-DIPPING Vats of Octagonal Shape Meet with Success in Nevada Constructed first as an experiment, an octagonal cattle-dipping vat, built in Elko County, Nev., during 1931, proved so successful that

stockmen of the county promptly built several more vats of the same type. The dipping vat customarily used in eradicating cattle scabies

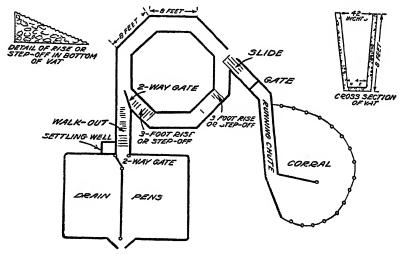


Fig. 1 in 12 -Pl in of oct wonal dipping vat

and several other parasitic diseases of livestock is a long trench or trough commonly built of concrete, wood, or metal, containing a medicated solution through which animals are made to swim. The movement of animals through the vat is controlled by men stationed at the sides of the vat, who operate gates and also push each animal entirely under the surface at least once, so that the solution may reach parasites on the head as well as on other parts of the body.

The octagonal type of vat, though more expensive to build than a straight one, has proved to possess several advantages that more than offset the additional construction cost when large numbers of animals are to be dipped. The main points of superiority are: (1) The dipping operation is more thorough; (2) it is almost automatic; (3) it is easier on the cattle than the old method; and (4) it permits a larger number of cattle to be dipped without the vat being recharged with fresh solution.

The octagonal vat consists of an 8-sided trench made preferably of concrete and so arranged that the animal must swim around for the required time of dipping, usually two minutes, before being released.



FIGURE 13 -General view of the drain pens, dipping vat, and corrals

In this way the usual fretting caused by the necessary waiting in a straight-trench vat is prevented. A submerged ledge at the entrance causes each animal to duck itself on entering the vat and two other step-offs or drops (fig. 12) automatically give additional duckings. The outside circumference of the octagonal vat here described and illustrated is 64 feet, and the dip capacity is approximately 5,000 gallons. Such a vat will hold 8 mature cattle or 10 yearlings at one time. As many as 180 cattle have been dipped in an hour, and in one instance 819 cattle were dipped in five hours. Since several hundred thousand dippings are frequently necessary in eradicating cattle scabies from a single county, large-scale equipment materially expedites the work. The octagonal vat is not recommended, however, when fewer than 3,000 head of cattle are to be dipped.

# Dipping Cattle Affected with Scabies

The new type of vat is especially convenient in dipping cattle seriously affected with scabies. Such animals should be immersed about four minutes. When this length of immersion is necessary, the exit gate is kept closed until the animals have made enough trips around the vat for the required time to elapse. The gate is then opened and the animals enter the walkout which leads to the drain pen. (Figs. 13 and 14)

The cost of an octagonal vat, including a steam boiler for heating the dipping solution, has ranged from \$1,500 to \$1,800. With one exception these figures represent contract jobs and in most cases include corrals for holding the cattle before and after dipping.

An unusual feature of one vat is that the dipping fluid was heated with spring water warmed by an extinct geyser.  $\Lambda$  2-inch pipe leading from the spring extends around the vat a few inches from the bottom,

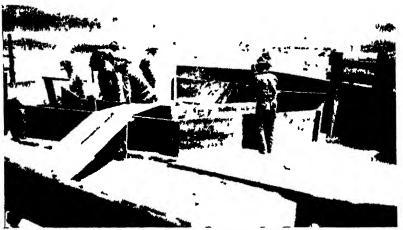


FIGURE 14.—An octagonal dipping vat in operation. The attendants need only to keep the animals moving while they are in the vat

carrying water with a temperature of 128° F. This temperature is sufficient to maintain the dipping fluid at the desired uniform temperature of 102°. This method of heating the fluid saved the cost of a heating plant and the cost of fuel for heating the fluid during each operation.

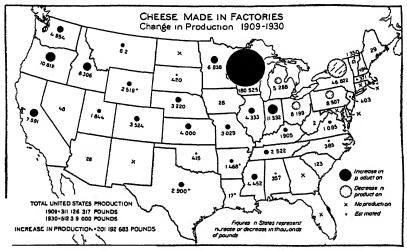
L. C. Butterfield, Bureau of Animal Industry.

HEESE Production Is Still Largely Confined to a Few Areas in U. S.

Cheese production in the United States, like the production of many other agricultural products, is very largely confined to certain definite

to a Few Areas in U. S. other agricultural products, is very largely confined to certain definite areas. In these areas it appears that the climate, soil, and other natural advantages, including the inclinations of the agricultural producers, are especially favorable to cheese production. Originally the cheese industry was localized in New York, Wisconsin, and Ohio. New York became famous for the flat and twin styles of American Cheddar cheese which to-day are referred to as "State Flats" and "State Twins" in many of the country's leading cheese markets. The Swiss-cheese industry has been extensively developed in Green County, Wis., and in parts of Ohio, with the result that Monroe, Wis., is known far and wide as the "Swiss cheese capital" of the United States. Brick and Limburger cheese factories were located in Dodge County, Wis., whereas the eastern, southwestern, and northwestern counties of that State produced principally an American Cheddar type of cheese. In recent years production of various Italian varieties of cheese has developed in California, whereas New York has continued to be the leading State in production of cream and Neufchatel cheese.

Generally speaking, the production area of the so-called foreign types of cheese, especially Swiss, Limburger, and the Italian varieties, has always been more limited than has the American Cheddar cheese territory, principally because of the factor of nationality and the methods of production. Consumers of these cheeses desire a flavor in the domestic product which is closely comparable to that of the im-For that reason, cheesemakers are commonly emported variety. ployed who have knowledge of the methods of manufacture used in a foreign country that produces a particular type of cheese. The manufacturing processes of certain foreign types of cheese are often complicated and the makers must be naturally adapted or have the ability and patience to produce the particular type of cheese. For these reasons the production of most foreign types of cheese has in the past been limited largely to communities where the people were chiefly of one nationality.



1 IGURE 15 -Increases and decreases in manufacture of cheese in different States

### Shift in Producing Areas

The rapid growth of the large industrial centers in the East brought about an increased demand for milk for fluid consumption, and as producers were able to realize a greater return from milk sold for fluid use than for milk delivered to the cheese factory, a shift occurred in the cheese-producing areas. The migration of cheese producers from New York and other Eastern States to the Middle West further contributed to this movement. New York became less important and Wisconsin gained in importance as a cheese-producing State. Dairymen on the Pacific coast realized that because of abundant pasturage and forage crops, favorable climatic conditions, and higher transportation costs on cheese shipped from the East and Middle West, there was an opportunity for cheese production in the West; consequently California and Oregon became important cheese-producing States toward the close of the nineteenth century.

With the trend of cheese production away from the territory around the large cities (fig. 15), decreases in production occurred in New York, Pennsylvania, and other Eastern States. Michigan became less important as a cheese State as the automobile industry developed and the manufacturing cities in the eastern part of the State required the milk from the cheese areas for market-milk purposes. In Wisconsin, also, cheese production shifted toward the northern part of the State and away from the large cities at the foot of Lake Michigan. On the Pacific coast, the cheese industry expanded rapidly in California during the period 1910–1920, but since 1920 production has barely held steady, because rapidly increasing quantities of fluid milk were needed for city consumption.

Another shift in cheese production that occurred during the last four years, and one of prime importance in so far as the industry as a whole is concerned, was in the South and Southwest. The diversification of farm crops, the eradication of the cattle tick, and the ravages of insect pests in cotton were among the factors that contributed to the pro-

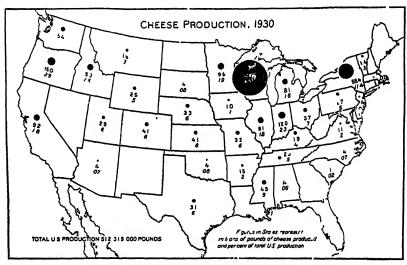


FIGURE 16 -Manufacture of theese in different States in 1930

duction of nearly 24,000,000 pounds of cheese in 1930 in 19 States of the South and Southwest. As late as 1927 cheese production in southern territory was of minor consequence. The home market in the South has enabled the southern producer to compete quite successfully with the northern producer, with the result that much of the Wisconsin cheese that was formerly consumed in the South, especially during the cotton-picking season, must now find other markets.

#### Wisconsin and New York Still Lead

Despite recent changes in the cheese-producing areas, Wisconsin and New York are still the leading cheese-producing States. (Fig. 16.) The former State continues as the leading producer of American Cheddar, Swiss, Brick, and Limburger, whereas the latter not only ranks second in American Cheddar cheese production, but also is the principal producer of Cream and Neufchatel cheese. The Italian varieties are produced chiefly in California.

Per capita consumption of cheese in 1930 reached the high point of 4.7 pounds, which exceeded the previous high record of 4.6 pounds reached in 1929. An almost steady gain in per capita cheese consumption is registered since 1917 when, because of war conditions, total cheese consumption declined very materially because many potential consumers were abroad, engaged in war activities. Therefore the decline in per capita consumption from over 3.5 pounds in 1914 to 2.9

pounds in 1917, was not truly representative.

The increase in per capita consumption of cheese during the last 20 years may be attributed to a number of factors, among which are more extensive advertising of the food value and use of cheese, the adjustment of cheese quality to meet consumer demand, more convenient packaging, and the increased use of cheese in the various so-called cheese specialities. Among the more important new developments in the manufacture and marketing of cheese during the last two decades must be mentioned the production of process cheese about 11 years ago, the development of artificially refrigerated curing rooms and with it more scientific curing methods, and the invention of means for marketing natural cheese in packages more convenient to the retailer.

W. J. Venske, Bureau of Agricultural Economics.

HESTNUT Lands Planted to Pine Stands Become Valuable in Northeast

Before the chestnut blight spread through the forests, magnificent pure stands of chestnut were frequent in the Northeastern States.

Little chestnut now remains, save dead trees and young sprouts which are presistently put forth, only to succumb to the disease. Rehabilitation of such blight-killed areas is an important forestry problem, especially where other valuable species to seed in the spaces left by

the chestnut are lacking.

Studies made by the Northeastern Forest Experiment Station in cooperation with the Massachusetts State College show that although natural replacement is adequate on these blight-killed areas, the best way to restore them to full growing capacity is to plant the bare spots with a high-grade timber species such as northern white pine. Since 1924 three permanent sample plots have been maintained on typical blight-killed chestnut land at Sunderland, Mass. Two plots are located where northern white pine was planted in 1919 when the dead chestnut trees were removed. On the third plot no planting has been done and the dead chestnut trees are still standing.

In 1929, 10 years after planting, the plots clearly showed the advantages of artificial over natural replacement. All the plots are now entirely covered with young growth—the planted plots have approximately 1,000 trees an acre, and the natural plot 810 trees to the acre. But the present stand on the planted areas is composed almost exclusively of the commercially valuable northern white pine, while on the naturally restocked area more than 50 per cent of the trees are of such commercially valueless species as red maple, moosewood, and witchhazel. In effect, on the planted plots potential brush land of low value has been converted in less than a decade into a young stand of high economic importance.

However, in converting cut-over chestnut areas to conifer stands, the sprout growth is a serious obstacle. The competition for soil nutri-

ments and moisture by the live stumps and the competition for light and crown space by the relatively faster-growing hardwood sprouts, interfere with the development of young conifers. On one of the two planted areas, weeding was practiced. Where the hardwood sprouts have been checked the pine canopy overtops that of the sprouts by about 3 feet. Where no weeding was done the conifers are overtopped by practically the same distance. On the weeded plot, 70 per cent of the pines have their crowns entirely free, whereas on the unweeded area only 50 per cent escape partial or total suppression.

Where the planted stock is small and the chestnut sprouts are tall, weeding prevents early suppression and frequently the death of planted trees. Thus the time required for the next timber crop to reach merchantable size is shortened and there is an earlier return on the investment. It is recommended that the first weeding take all the hardwood sprouts. Subsequently, less desirable seedlings can be removed to release enough selected individual trees to form a mature stand of

highest grade timber.

PAUL W. STICKEL, Forest Service.

HICK Leg Weakness May Be Prevented by Special Attention to the Feed When chicks are reared in strict confinement, two types of leg weakness, caused by incompleteness in the diet, may occur. One of these,

more correctly called rickets, is caused by a deficiency of vitamin D in the diet. The other type, known as nutritional perosis, or deforming leg weakness (fig. 17), is very probably caused by a dietary deficiency which, as yet, is not well characterized.



FIGURE 17 -Typical positions of chickens affected with nutritional perosis

When a chick is suffering from rickets, the bones of the legs become thickened and soft and the percentages of calcium and inorganic phosphorus in the blood serum are markedly decreased. This condition can be prevented by adding from 1 to 2 per cent of cod-liver oil to the diet.

Although cod-liver oil is very effective in preventing rickets, it appears to be of no value as a preventive of perosis. In fact, the writer's experience has been that perosis is not likely to occur when some diets are fed, unless they do contain either cod-liver oil or some other source of vitamin D. The ash content of the bones and the calcium and inorganic phosphorus content of the blood serum are not altered in chicks afflicted with perosis, and this fact distinguishes perosis from rickets.

The first symptoms of perosis are a slight puffiness of hock joints and a marked tendency on the part of the chicks to rest for long periods of

time in a squatting position. Within a few days the joints become noticeably enlarged, and sometimes the skin covering them has a bluish green cast caused by small hemorrhages in the underlying tissues. This stage in the development of perosis has been called "enlarged hocks" and "hock disease." This seems to be the turning point in the development of this condition, since in some cases, especially among White Leghorns, the chicks may recover to such an extent that there is scarcely any noticeable permanent deformity.

### Bending of the Lower Bones

Almost simultaneously with the hock joints becoming enlarged, the two lower bones of the legs, especially the one to which the toes are attached, show a slight bending which is very readily apparent when the chicks are X rayed. As the condition develops, these bones become more and more curved until gross deformity results. This stage has been referred to as "deformed leg bones." Frequently, in severe cases, the joint cartilage slips a little at the lower end of the second bone and the main tendon slips from its place, leaving the hock joint permanently disabled. This stage has been frequently called "slipped tendon."

Various workers have suggested that nutritional perosis is caused by feeding an excess of mineral matter, particularly bone meal. Although it appears to be true that excess mineral matter may have a tendency to aggravate the condition, experiments conducted at the United States Animal Husbandry Experiment Farm, Beltsville, Md., clearly indicate that a mere excess of mineral matter does not cause perosis to develop. These experiments have further shown that the relative amounts of calcium and phosphorus in the diet are very important. They also seem to indicate that rice bran is of considerable value in preventing nutritional perosis. By adding about 10 per cent of rice bran to two widely different types of diet which had caused the condition to develop, and simultaneously adjusting their calcium-phosphorus ratio to approximately 2.5:1, it has been possible to rear a number of groups of chicks without the occurrence of a single case of perosis.

In the typical diet consisting of corn meal, wheat or wheat byproducts, dried milk, and meat scrap, the addition of 2 per cent of finely ground limestone will give a calcium-phosphorus ratio very close to the desired value.

HARRY W. TITUS, Bureau of Animal Industry.

HINA'S Demand Large for Some U.S. Products, ✓ Despite Low Incomes

An American farmer traveling into the interior of China, and walking across the countryside on the paths that connect the innumerable vil-

lages, is at once impressed with the great number of people on every hand—in the fields, in the farm huts, in the villages, and in the shops and with the meager living standards, if not the poverty, of the masses. Not much purchasing power is evident. Individually, it is very small. But a number of foreign wares touch the lives of these people and the small individual demand totals to a surprising volume if any substantial part of the vast population is reached. Various conditions have brought about a significant demand for certain American farm products, the principal items being cotton and flue-cured tobacco from the South, wheat flour from the Pacific Northwest, and fresh fruits from the Pacific coast.

#### Cotton

In recent years cotton has taken the leading place among these products. Prior to the World War a modern spinning industry was



FIGURE 18.—Home spinning continues to be a common practice in China

only partly developed in China but the war stimulated a rapid expansion and now after a rather stationary period of seven years the industry is again expanding. To-day China has approximately 4,000,000 spindles and, instead of importing cotton yarn heavily, as was the case before the war, has a small net export trade. In spite of this grow-

ing spinning industry, home spinning is still extensive.

For its spinning industry, China is only partly dependent on foreign cotton, since the bulk of consumption is of Chinese growth from a commercial crop of more than 2,000,000 bales and from a farm crop of around 3,000,000 bales annually. Most Chinese cotton ranges



Figure 19 —A cotton-goods hawker in Honin Province carries his stock of piece goods on a wheelbarrow

from % to % inch in staple length, and is distinctly inferior to American cotton in that regard, but some areas of China produce % to 3½ inch staple. Except in years of abnormally low prices in the United States, such as 1926 and 1931, American cotton is not used in competition with the shorter Chinese cotton in spinning lower than 20-count yarn. Un-

til the present time the spinning of higher count yarns has been done largely in Japanese-owned mills which represent about one-third of the total spindles of China, and consumption of American cotton has been largely by these Japanese mills. But there is an evident tendency on the part of Chinese mills to spin higher counts and to use some American growth in mixtures for 20-count yarn. Imports from the United States during the 1930 crop year reached 450,000 bales. Higher tariffs on cotton piece goods, particulary those levied in a measure that became effective January 1, 1931, have stimulated the weaving industry. As this industry grows, more and more of the longer-staple cotton will be needed. Certain districts in China, already growing staple that competes with American cotton, are capable of a larger production, but this development is contingent upon improvements in transportation and marketing, and upon political conditions.

### Cigarettes

The cigarette business in China, with which the United States leaf trade is associated, depends for its volume upon low price per unit and

upon thorough distribution. With no other essentially foreign article has it been possible to keep the price per unit down so low that an appeal can be made to the masses in a population variously estimated at 250,000,000 to 400,000,000. With few other foreign articles has there been such a thorough distribution. The bulk of sales consists of cigarettes that sell to dealers at 10 or more for 1 cent. Many of the retailsales



FIGURE 20 - 1 type il cigarette stand on a street of a Chinese city

consist of single cigarettes. It is a common sight to see a coolie buy two cigarettes, place one behind his ear for later use, and leisurely smoke the other; or he may save his first cigarette when it is half used. Even such low prices are prohibitive for millions of Chinese, especially in distant places where heavy transportation charges must be added or where taxation is excessive. Prices per unit must be maintained at an incredibly low level in order to secure a volume of business.

But aggregate consumption is tremendous, for cigarettes go into the far corners of this extensive and populous republic. Cigarette peddlers and shops handling cigarettes seem to occur wherever there are streams of traffic or groups of workers. Annual sales in 1930 and 1931 probably exceeded 1,200,000 cases of 50,000 cigarettes each. Political disturbances, irregular taxation, and many difficulties during past years have tested and established the strength of the demand for cigarettes in China. In spite of difficulties, consumption increases. The

considerable replacement of native forms of smoking by cigarettes is chiefly the result of enterprising and resourceful sales promotion and

advertising methods by foreign and Chinese companies.

In many foreign countries, habits and tastes have been adapted to domestic tobacco, but in China there has developed such an exclusive preference for cigarettes from American flue-cured tobacco, introduced by foreign companies, that quality in eigarettes is measured in terms of quality of American flue-cured leaf used in their manufacture. With increased cigarette consumption, however, has come a domestic flue-cured tobacco industry that also forms a source of leaf supplies. Foreign companies selected three areas in which the growing of flue-cured tobacco from American seed was introduced, taught, and promoted. Production has changed from year to year, depending considerably on the price paid and the buying activity of foreign companies, but recently low silver exchange has made it necessary for these companies to use more and more domestic leaf. Domestic production in 1931 was approximately 100,000,000 pounds. In general the quality is much inferior to American leaf, as the tobacco is lacking in body and aroma, but when mixed with various quantities of American The average leaf it must serve in the cheaper brands of cigarettes. price paid to growers for the 1931 crop is reported as equivalent to 4 cents a pound. American leaf supplemented local production to the extent of 128,000,000 pounds in 1929 and 144,000,000 pounds in the 1930 crop year.

#### Wheat and Flour

To sell wheat to China may seem like selling coal to Newcastle since China's annual wheat production is probably more than 800,000,000

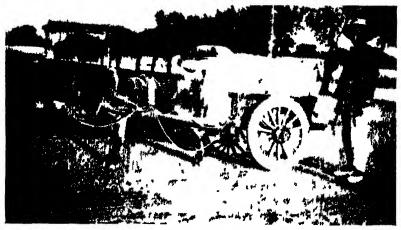


FIGURE 21 - 1 menc in flour being distributed in the ancient city of Penning, China

bushels and exceeds our own production, but to a surprising degree population has caught up with the crop production, and surpluses, if any, are small. Then, too, over much of China, lack of railways and lack of cheap transportation facilities limit the movement of grain to distant markets. Famines may occur in Provinces almost adjacent to those having good wheat crops. For certain deficit districts along the coast it is simpler and more economical to import foreign wheat and

flour. In north China wheat is as standard a cereal in the diet as is rice in central and south China. The milling industry in Shanghai, which exports most of its output to ports in north and south China, buys significant quantities of foreign wheat when low grades and exchange rates permit it to buy to advantage, but it is not a consistent user of American wheat. A number of ports in north China are substantial markets for flour from Shanghai, the United States, Canada, and Japan.

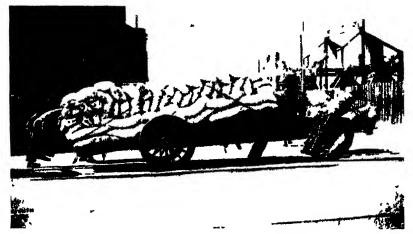


FIGURE 22 - Moving lots of American flour at Tientsin, China

Takings from our Pacific Northwest mills seem to be determined by the size of the wheat crop in the Tientsin area, mill operations in Shanghai, and comparative prices. Imports reached the highest figure in 1929 when imports of American flour for all China were 3,300,000 barrels. Not much foreign flour, however, penetrates far from the port cities and our trade is chiefly confined to spots on the coast or to near-by accessible places. Foreign wheat and flour merely touch the fringes of the country and of its food supply.

#### Other Items

Special aspects of other items in our export trade may be briefly mentioned. American condensed and evaporated milk continues to grow in popularity as food for babies, but the Chinese generally consider these products as medicine rather than as food. Raisins have found a limited place in the Chinese diet and confections, where other dried fruits have failed almost completely. Domestic oranges of many varieties fully deserve their popularity in China but the all-season character of American varieties enables the wealthy Chinese in Shanghai and other port cities to enjoy this fruit during the spring and summer months when Chinese oranges are not on the market. American canned fruits from California are so prized as to be used as gifts at the Chinese New Year celebrations.

# Low Silver Exchange Cuts Buying Power

No appraisal of market demands in China can be made without considering the far-reaching effect of the depreciation of silver and with it

the depreciation of the currency of China Prior to the World War, silver and gold had a relatively stable relationship, but since 1914 silver has gone through a cycle of excessively high and excessively low extremes. Absolute exchange values over a period of years are not so important as reasonable stability. Exchangerates over a 4-year period prior to 1930 were somewhat constant, with the Chinese silver dollar equivalent to 45 cents American currency. In late 1929, however, silver followed the course of commodity prices and during the latter half of 1931 the Chinese dollar was worth less than 25 cents or about onehalf of its value in 1928 and 1929. This exchange situation has the same effect as would the doubling of the silver price for foreign goods if the United States price remained stationary. United States prices have dropped but unless the reduction is 50 per cent or more the silver price in China is higher than it was. Chinese wages and domestic price levels have not followed the exchange rate and probably will do so only very slowly, so the depreciation of silver practically represents a corresponding reduction in purchasing power.

Many complications result from this situation. The possibility of an outlet which low prices for certain farm products might create in China has been offset by the exchange rate. High prices in Chinese currency have made many foreign products almost prohibitive. A rise in silver value and in silver exchange would be a helpful development in restor-

ing Chinese purchasing power.

PAUL O. NYHUS, Bureau of Agricultural Economics.

### CITRUS Fruit Coloring by Ethylene Process Much Improved Lately

Some of the early or fall varieties of oranges and grapefruit ripen while the fruit is still green in color. Later varieties that mature in the spring or

summer assume the color of full maturity during the winter while the fruit is still immature, but when warm spring weather occurs the rind may turn green again. Thus while the edible part of the fruit ripens there is a "regreening" of the rind. Grapefruit growing on the inside of densely foliated trees never develops full color, although some of the best-flavored fruit is produced there. There is, therefore, no definite relation between flavor or maturity and the color of the fruit while on the tree. However, there is a very significant relation between the color of the fruit offered for sale and the price that it will bring, and citrus fruit producers have always faced the problem of making the color of ripe fruit match its flavor.

The orange and yellow pigments are located deep in the rind and remain masked so long as there is any green color in the outer rind. After the fruit is picked there is a slow loss of green through natural processes, but under commercial conditions it has become necessary to color the fruit more rapidly without changing its natural flavor.

Various methods of coloring the fruit, such as subjecting it to the exhaust fumes of a gasoline engine or to the pungent fumes arising from the incomplete combustion of kerosene, have been used. Under favorable conditions fruit could be colored by these methods in a few days. However, there was always danger to human life when the gasoline-engine exhaust fumes were confined in the coloring rooms, and the kerosene fumes sometimes imparted a disagreeable flavor to the fruit. In addition, the latter involved a considerable fire hazard and often caused serious property loss.

## Commercial Ethylene Now Used

When it was discovered that ethylene gas is the essential component of kerosene fumes so far as coloring the fruit is concerned, methods were devised whereby commercial ethylene was substituted for kerosene fumes in the coloring process.

Besides the concentration and kind of the gas which is the active agent, other factors upon which coloring depends have been found to be the temperature, humidity, and ventilation of the coloring room. All these factors are influenced by the type of construction, arrange-

ment, and equipment of the room.

Loosely constructed and uninsulated rooms can be used during warm weather, provided the rooms are ventilated frequently, but when artificial heat must be supplied great difficulty is encountered. Unless a uniform temperature can be maintained throughout the room there will be a lack of uniformity in the rate of coloring and it may be neces-

sary to treat some of the fruit for excessively long periods. It is essential to shorten the coloring process as much as possible, because the high temperatures and humidities required are very favorable to the development of stemend rot and other types of decay.

The greatest practical progress in the development of improved coloring practices has been made

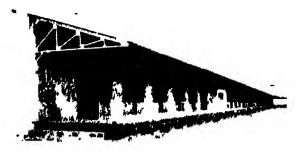


FIGURE 23—Receiving platform of a Florida (titus packing house showing doors to coloring rooms in which the fruit is placed assoon as received. Packing houses are usually arranged so that the fruit can be moved in a straight line from the coloring rooms through the packing space and into cooling rooms on the opposite side of the building, whence it is loaded directly into refrigerator circs.

since 1929. At that time the Mediterranean fruit-fly outbreak in Florida necessitated the construction of a large number of well-insulated rooms especially equipped for air conditioning in order to maintain the fruit under uniform conditions during treatment for this pest. Rooms of this type proved to be admirably adapted for coloring purposes and have now very largely supplanted the earlier kinds throughout Florida. (Fig. 23.)

# Equipment of Coloring Rooms

These coloring rooms are usually rectangular in shape, with the ceiling 7 or 8 feet above a slatted floor supported on 2 by 6's placed over a tight subfloor. Such a floor is essential for good air circulation. Powerful blowers are placed along the side wall or above the ceiling to draw the air from beneath the floor and through a duct to the blowing apparatus, where it is brought to the desired temperature and humidity and where the coloring gas is introduced before the air and gas are forced down through the fruit. (Fig. 24.) The multivane type of blower rather than the propeller type has proved most satisfactory. The blower is equipped with an adjustable opening on the suction side to permit continuous introduction of fresh air and to prevent excessive

concentration of carbon dioxide and other waste gases within the 100m. In this manner the air in the coloring room is continuously recirculated and uniform conditions are maintained throughout. In a 100m of 1-carload capacity an actual delivery of at least 2,000 cubic

feet of air per minute is desirable.

During cold weather the air is heated by being passed over a large steam radiator and is humidified by steam introduced from a small jet During warm weather the condition of the air is regulated by passing it through a water spray which absorbs excess heat and raises the humidity. The temperature is controlled by an automatic thermostat to prevent the fruit from becoming overheated during the coloning period.

The ethylene gas is introduced and regulated by two reducing valves attached to the high-pressure cylinder in which it is purchased. The gas is usually released at a pressure of only a fraction of a pound and is conducted through a \( \frac{1}{2} \)-inch main-line pipe with laterals leading into

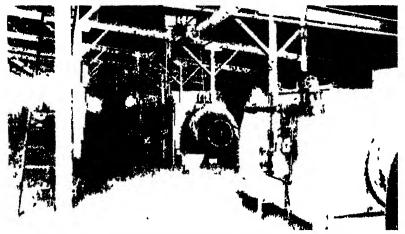


Figure 24.—An conditioning equipment above ceiling of coloring rooms, showing fairs, steam and water pipes, and othylene gas line

the air-conditioning chamber of each coloring room. At the discharge end of each lateral pipe there is a nozzle with a cut-off to enable one to turn the gas on or off in a given room without affecting the operation of other rooms. The gas is turned on when the room is filled with the fruit and is left on until the coloring is completed. Being thoroughly mixed with the air before its introduction into the coloring room, it is supplied in uniform concentration at all times. It is most satisfactorily used at a rate of about 3 cubic feet per day per room of 1-carload capacity.

# Varying Reactions in Different Crops

Experience has shown that few citrus crops react alike to the coloring process, since growing conditions have a marked influence on the rate of coloring. Variable weather conditions and variations in the condition of the fruit itself from time to time, prevent adoption of a standardized coloring procedure. In general, however, it is recommended that the temperature of the fruit should be brought to 80° to 85° F. within two

or three hours if possible. To accomplish this it is sometimes necessary to use live steam, which also brings up the humidity and prevents wilting of the fruit. It is desirable to maintain the relative humidity within the range of 80 to 92 per cent, using the higher humidity at the start of the process. Care must be taken, however, to prevent the fruit from remaining wet for prolonged periods. After the fruit is brought to the desired temperature, live steam in the coloring room can be dispensed with and the desired humidity can be maintained by manipulating the air-conditioning equipment already described.

Ventilation should be provided during the entire coloring period by keeping the fresh-air vent in the air mixer open continuously. The size of the opening necessarily differs with the size and tightness of the room. Usually an opening of 6 to 8 square inches is adequate for a

coloring space of 2,200 cubic feet.

Coloring is but one step in handling the fruit from grove to market. It must be coordinated with other essential operations, in all of which one cardinal principle should be emphasized—the maintenance of maximum speed consistent with careful handling, so that the fruit may be packed and cooled without delay.

J. R. WINSTON, Bureau of Plant Industry.

Could Be Expanded with Advantage in Some Areas

Before 1917 cottage cheese did not have the commercial importance that it has to-day. It had been made both in the home and

by some dairy plants in various sections. The manufacturing methods commonly used, however, were such that the product was of nonuniform quality and did not create an extensive demand. Nor was any considerable volume of skim milk utilized in its manufacture.

Not until during the World War, when conservation of food and utilization of all food products became a question of economic importance, was there any concerted effort to improve manufacturing methods and to utilize large amounts of skim milk in the manufacture of cottage cheese. At that time, although large quantities of skim milk were being fed to livestock on the farm, millions of pounds were also being poured into creamery and milk-plant sewers. To utilize this waste as a human food the United States Department of Agriculture in 1917–18 inaugurated an intensive campaign to increase the manufacture and consumption of cottage cheese. Many creameries and milk plants throughout the dairy sections of the country took up its manufacture on a commercial scale. This may be said to be the real beginning of the cottage-cheese industry, for since that time its production has increased steadily.

Throughout the campaign cottage cheese was widely advertised in newspapers and on Government posters placed in restaurants, markets, and other public places. The Department of Agriculture also published information on the food value of cottage cheese and developed new methods by which it could be served as a human food in different combinations. The department realized that in order to increase the consumption of cottage cheese it would be necessary for the manufacturers to put a good product of uniform quality on the market. To accomplish this a standardized method of manufacturing was adopted

and especially trained men were assigned to different sections of the country to work with creameries and milk plants. Practical demonstrations of the method of manufacturing were given at each plant until a satisfactory and uniform quality of cheese was being produced. This introductory work, which was a part of the campaign, stimulated a new and increasing demand for cottage cheese. The manufacturers lost no time in putting a good-quality product on the market. Since that time there has been a steady increase in the annual production of cottage cheese, including pot and baker's, until by 1930 the amount manufactured was 240 per cent greater than in 1918.

According to estimates of the Bureau of Agricultural Economics of the Department of Agriculture, in 1918, the first year for which production figures were available, 28,350,000 pounds of cottage cheese, including pot and baker's, was manufactured. In 1922 the total was 32,389,000 pounds, in 1926 it was 67,977,000 pounds, and in 1930 it was 97,641,000 pounds. The amount of cottage cheese made in 1930 represents 644,430,600 pounds of skim milk, and, at the average price received by the manufacturer for plain cottage cheese, the value of the 1930

production was approximately \$6,000,000.

In 1930, 598,008,000 pounds of cheese of all varieties was manufactured in this country. These varieties represent eight different classes and rank in volume of production as follows: (1) Cheddar, which represents 64.6 per cent of all the cheese produced in this country; (2) cottage, including pot and baker's, 16 per cent; (3) brick and Munster, 5.6 per cent; (4) cream and Neufchatel, 5.4 per cent; (5) Swiss, including block, 4.3 per cent; (6) Italian varieties, 1.4 per cent; (7) Limberger, 1.3 per cent; and (8) all other varieties, 1.1 per cent. As to value the order is slightly changed and is as follows: (1) Cheddar, (2) cream and Neufchatel, (3) cottage, including pot and baker's, (4) Swiss, including block, (5) brick and Munster, (6) Italian varieties, (7) other varieties, and (8) Limberger.

# A Product of Importance

It has been found that cottage cheese, including pot and baker's, ranks second in volume produced and third in value. According to these figures it would seem that cottage cheese is no longer merely a by-product of the dairy industry but is a product of considerable importance. Many creameries and milk plants in regions where skim milk is available and where a market for cottage cheese can be developed would no doubt find it profitable to give more attention to its manufacture.

To increase the consumption of cottage cheese a good and uniform product must first be made available to the public. To accomplish this there must be a supply of skim milk of good quality. The manufacturer must adopt a method that will produce the particular type of cottage cheese most in demand, then handle the manufacturing process as carefully and as uniformly as he does the manufacture of higher-priced dairy products.

The Bureau of Dairy Industry has recently perfected a method which consistently produces excellent results. By using this or a similar method more dairy-products plants could improve the quality of their cottage cheese and thus utilize their skim milk more profitably.

NOTTON Communities Showing More Interest in One-Variety Plan

The advantages of limiting production to a single variety in each community or district are becoming more and more widely recognized among cotton grow-

ers and others interested in cotton production. The 1-variety plan has already been adopted and applied in most of the cotton-producing districts of the southwestern irrigated valleys, and the experience in these communities may facilitate the extension and stabilization of the sys-

tem of organized production in the castern Cotton Belt.

The primary object of 1-variety organization is to establish and maintain a regular supply of pure seed, to be used as the basis of production by the entire community. (Fig. 25.) The first step to be taken, where an active local interest in the 1-variety plan has developed, is to form a growers' association to which all bona fide growers



FIGURE 25—A breeding block of Acala cotton on United States Acclimatization Field Station, State College, New Mexico, where the purity and superior quality of the seed are maintained for organized community, planting

within the community should be eligible. To give stability and continuity to the effort, each member should sign a 5-year agreement to plant only the variety of cotton designated by the board of directors.

# Community Boundaries

In California the 1-variety districts are designated by counties, and many of the cotton-growing areas of the Southwest are separated from each other by mountain ranges or stretches of unirrigated desert, which afford ample protection from the danger of crossing with other varieties or with other stocks of seed. Where separative geographical features do not exist, as in many parts of the eastern Cotton Belt, more care has to be taken in locating seed-producing areas that can be protected in other ways.

One-variety areas also may be located with reference to soil types, in

the interest of safer and more regular production of seed.

A gin unit, or the area from which a single gin draws its custom, may afford a satisfactory basis of a community effort, particularly if the gin is isolated enough to be free from the competition of other gins. Having all of the custom of one gin of the same variety brings obvious advantages in keeping the seed pure and in being able to regulate the gin machinery so that there is a minimum of damage to the fiber.

### Selecting a Variety

Community production of any good variety is better than a multiplicity of varieties. The better the variety selected, however, tho easier it is to attain community production. Properly conducted variety tests are the best means of determining the relative value of a variety, but the community organization need not wait for local tests to be made. Recommendations of the State university or extension service can be followed safely, or the association can be formed and the members choose by note the variety with which to start. In case another variety is later found to be better, a local seed supply can be developed and the entire community changed over. The initial variety, however, should be one of which an adequate supply of pure seed is obtainable.

### Final Stages of Community Organization

Most growers can readily appreciate the advantages of 1-variety production, but a community often contains a small proportion of growers to whom these advantages are not so easily discernible. A 100 per cent 1-variety community is therefore much more difficult of attainment than a nearly 100 per cent community, and some means

of protection against reactionary growers may be needed.

The gins can be of material assistance in dealing with this problem by refusing to gin outlawed varieties. The communities can also be protected by county ordinances or State laws prohibiting the planting, harvesting, and ginning of other than one variety in districts that are attempting to organize themselves on this basis. Restrictive ginning and legal measures, however, should not be invoked to coerce mixedvariety communities into 1-variety production, but should apply only to communities already established on a 1-variety basis and practically unanimous in their choice of variety.

H. G. McKeever, Bureau of Plant Industry.

OTTON Data Record Variation in Staple Length, 1928-1931

Data on the grade and staple of cotton ginned in the United States for three consecutive years are now available, and similar data on ginnings up to Decem-

ber 1 of the fourth year are available. We are approaching the time, therefore, when it may be possible to get some perspective of the trend of staple length—some definite information as to whether the staple length of American cotton is deteriorating or improving. Data covering a period of but three or four years are, of course, inadequate as a basis for definite conclusions, information covering a longer period being required to establish trends with any degree of certainty. But the figures now available do permit of some interesting comparisons.

Figure 26 shows the proportions of the several staple lengths of American upland cotton ginned in each of the three cotton years, 1928, 1929, and 1930; and Figure 27 shows corresponding proportions of these staple lengths ginned prior to December 1 in each of the four years, 1928, 1929, 1930, and 1931.

In each of the three years for which data on the entire crop are now

available, the proportion of the total crop that was 1½ inches and longerin staple constituted less than 5 per cent of the total ginnings. Not only do these lengths constitute a comparatively small part of the crop, but they are grown, for the most part, only in restricted areas. The proportion of the crop ranging in staple length from ½ to 1½ inches, inclusive, grown quite generally throughout the Cotton Belt, consti-

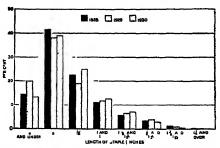


FIGURE 26 —Percentage distribution, by staple length, of cotton ginned in the United States, crops of 1928, 1929, and 1930

tuted approximately 81 per cent in 1928, more than 75 per cent in 1929, and more than 83 per cent in 1930.

### Available Figures Inconclusive

Persons asserting that the staple length of American cotton is deteriorating point to the large quantity of cotton shorter than ¼ inch that was ginned from the crop of 1929, as compared with that ginned from the crop of 1928. It should be borne in mind that, although the proportion of these short lengths increased from more than 14 per cent of the crop in 1928 to 20 per cent in 1929, it decreased to approximately 13 per cent of the crop in 1930. In so far as ginnings to December 1 may be taken as indicative, a further decrease may be expected for 1931. This expectation is based on the fact that cotton

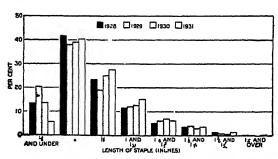


Fig. 27 —Percentage distribution, by staple length, of cotton guined in the United States prior to December 1 of the years 1928, 1929, 1930, and 1941

shorter than % inch constituted only about 5½ per cent of ginnings prior to December 1, 1931, as compared with 13½ per cent, 20½ per cent, and 13½ per cent, respectively, for the corresponding periods in 1928, 1929, and 1930. A similar comparison shows that an appreciably larger proportion of cotton ranging in length from % to 1½

inches was ginned prior to December 1, 1931, than during the corresponding period in either of the three preceding years. In this connection, attention is called to the favorable weather conditions prevailing throughout a great part of the 1931 season.

A comparison of Figures 26 and 27 will show that the proportions of the various staples in the ginnings to December 1 have not materially differed from those of the entire crop during the last three years.

Although no official data are available that would indicate the extent of deterioration in staple length of American cotton prior to the inauguration of the grade and staple estimates work of this department, the preliminary figures now available do not indicate that deterioration in staple length has occurred during the last three years.

W. B. LANHAM, Bureau of Agricultural Economics.

OTTON Exports to Russia
Decline as Acreage and
Output There Increase

Before the World War, Russia ranked sixth among foreign countries in mill consumption of American cotton. It held a similar place

in 1927-28 when the postwar peak of American cotton consumption by Russian mills was reached. In the last few years Russia's home production of cotton has increased considerably, reaching the prerevolutionary peak, and its imports of American cotton declined until they have practically ceased during the 1931-32 season. Russia occupies an important position in the world of cotton. Among cotton-growing and cotton-manufacturing countries it ranks sixth in number of spindles; fifth in production of lint; and fourth in acreage devoted to cotton. The increase in Russian cotton production has attracted widespread attention and given rise to the question: How much competition is the American producer likely to meet from Russian cotton?

The possession of a domestic source of raw-cotton supply makes the Union of Socialist Soviet Republics, as Russia is now officially styled, unique among the European cotton-manufacturing countries. It also has a large domestic market for cotton goods. Although the production of Russian cotton increased rapidly during the pre-war and early war years and again resumed an upward course after the interlude of the revolution and civil war (1917–1921), it has usually not been sufficient to satisfy the requirements of the Russian manufacturing industry. The Russian cotton industry depended, at least until recently, on foreign sources (principally the United States) for a large proportion of its raw material; hence the importance of Russia as a market for American cotton.

American cotton on the Russian market has had to meet the increasing competition of the Russian-grown cotton from Turkestan or central Asia and Transcaucasia. Cotton has been grown on irrigated land in Turkestan and Transcaucasia for many centuries. The former section is especially important and accounts for the bulk of the Russian cotton supply. Cotton in Turkestan is grown by small peasant cultivators who formerly used, for the most part, primitive implements and a prodigious amount of labor in raising the crop on their small plots.

Even before the World War, there was a movement to make Russia self-sufficient, as far as possible, in the matter of raw cotton supply. Both the Government and the manufacturers were interested in this project. Domestic production was encouraged by a high protective tariff on imported cotton, taxation privileges for the growers, extension of railway facilities in the cotton-growing districts, and new irrigation construction on which extension of the Russian cotton acreage principally depended. Such measures, coupled with the fact that cotton is, on the whole, well adapted to the climatic conditions and the small-scale, highly intensive agriculture of Turkestan, resulted in a large expansion of the acreage and production of Russian cotton.

### Expansion in Turkestan

The area devoted to cotton in Turkestan more than trebled between 1890 and 1910, as far as the inadequate statistical data enable one to judge. Considerable expansion in acreage also occurred in Transcaucasia. At the same time, the displacement of native cotton varieties by American upland types proceeded rapidly so that little native cotton was being planted at the outbreak of the war. The expectation of increased prices, with the entrance of Russia into the World War, provided a further incentive to the extension of cotton cultivation and by 1915 Russian cotton production reached a record figure of 1,500,000

to 1.700,000 bales of 478 pounds each.

Consumption of domestic cotton also exhibited an upward trend. In 1890, domestic cotton constituted one-fourth of the total Russian mill consumption (including Russian Poland but excluding Finland); by 1910, it was more than a half; and in 1914, when the peak of Russian mill consumption was reached, it constituted 60 per cent. Consumption of American cotton likewise showed an actual increase, though its relative importance in the total Russian mill consumption declined In 1890 Russian mill consumption of American cotton amounted to 375,000 bales of 478 pounds, or 62 per cent of the total, and in 1910, 596,000 bales, or 36 per cent of the total.

The World War and the Russian revolution with its consequent economic isolation of Russia and disorganization of economic life, led first to a decline and later to a cessation of imports of cotton into Russia. Imports were not resumed on any considerable scale until 1923. Consumption of American cotton by Russian mills, which was estimated at only 27,000 running bales in 1921–22, increased to 493,000 bales during the season of 1927–28, exceeding even the pre-war record. A rapid decline, however, has followed and apparently little American

cotton was consumed during the season 1930-31.

## Significance of the Drop in Imports

The downward trend of Russia's cotton imports during the last three years seems to suggest that the country is nearing its goal of cotton independence. But it should be borne in mind that, with a monopoly of foreign trade and of the textile industry, together with the power to ration consumption, the Government can restrict imports in order to maintain a favorable balance of trade, even should the domestic production fall short of replacing imported supplies. The Government appears to be making every effort to push the cotton industry. Contracts with growers for acreage, on the basis of which advances are paid to them, have been made each season. To provide an adequate supply of cheap grain for central Asia so that the farmers could devote a larger acreage to cotton, a railroad connecting Turkestan with the grain regions of Siberia was constructed. Reduced taxation of land under cotton and exemption for a 5-year period of cotton acreage in new growing regions were granted.

Selected seed, modern implements, and tractors are being introduced. In 1923-24 there were only 39 tractors in central Asia; by 1926-27, the number had increased to 1,270; and by 1929-30 to 3,609. Use of mechanical power relieves the shortage of draft animals, which is acute among the cotton growers of Turkestan (many of whose holdings, however, are too small to permit a profitable employment of their

own stock), and as it diminishes the required feed-grain acreage it increases the acreage that may be devoted to cotton. To utilize the available supply of tractors efficiently, a number of them are operated together with other improved machinery under single direction for a number of farms. These units are called "machinery tractor stations." Collective and State farms which accounted for a little over 70 per cent of the 1931 acreage are replacing the small individual grower. However, there are chronic complaints of various defects in the organization of the Russian cotton-growing industry, such as shortage of labor, inadequate supplies, or poor distribution of grain and manufactured articles in the cotton-growing districts, etc. The average yields are below pre-war and have shown a downward trend during the last few years. Nevertheless, in 1930 a crop of more than 1,500,000 bales of 478 pounds (or 68 per cent above the 1909–1913 average production) was harvested, thus reaching the previous Russian peak production of 1915.

Russian Mill Consumption

In 1909–1913, domestic cotton constituted little over half of the total Russian mill consumption. To cover the requirements of the Russian cotton industry, if the output remains at the pre-war level, it would apparently be necessary for the Russian production of cotton to be approximately double that of 1909–1913. However, the present capacity of the spinning industry of the Union of Soviet Socialist Republics is nearly one-fifth less than that of pre-war Russia because of the secession of territory. This, in turn, tends to reduce the raw material requirements, except as the reduction in spindlage may be offset by other factors such as an increase in the number of hours worked, etc. On the other hand, cotton production in 1930 was almost 70 per cent above the average for 1909–1913 and a further increase was expected in 1931 with the larger acreage. It would seem, therefore, that the Soviet Government can not be very far from the attainment of its objective of self-sufficiency on a pre-war basis in the matter of cotton supply.

Although exports of American cotton into the Union of Soviet Socialist Republics are primarily affected by this situation, it is noteworthy that the Government is also planning to develop the growing of Egyp-

tian (long-staple) cotton.

An output of cotton goods not exceeding pre-war quantities would entail a standard of consumption below pre-war standards, as the population of the Union of Soviet Socialist Republics increased between 1913 and 1931 by approximately 15 per cent. Furthermore, a considerable portion of the Russian pre-war supply of cotton yarn and cloth was provided by the highly developed manufacturing industries of the Polish and Baltic regions, which seceded after the revolution and which were formerly not separated by customs barriers from therest of Russia. Therefore, should an expansion of the Russian textile industry and a rising standard of living of the Russian population occur in the near future, a further considerable increase of Russian cotton production, or alternatively, greater imports of foreign cotton, would be necessary, especially since the growing industrialization of the Union of Soviet Socialist Republics probably would result in the increased industrial use of cotton. On the other hand, there must be borne in mind the possible production of substitute textile fibers. Such substitutes, if found, would, of course, tend to diminish the use of cotton in the future.

#### Additional Land Available

As far as land resources are concerned, there are undoubtedly opportunities for a further expansion of the Russian cotton acreage as well as for increasing the yield per acre by improved cultural methods. The increase during recent years has taken place largely through the displacement of other crops, principally cereals on the irrigated lands of Turkestan and Transcaucasia. There may be a possibility of a further shift to cotton on irrigated land. Such land was roughly estimated at 11,000,000 to 12,000,000 acres as against a cotton area of some 4,000,000 acres. Not all of the irrigated land can be devoted to cotton; not all is actually sown to crops each year. In the opinion of some Russian authornies cotton should not occupy more than one-third to one-half of the sown area, but others consider a higher proportion of cotton feasible. The irrigated area undoubtedly can be greatly augmented through new construction, but this will involve considerable capital outlay.

A less costly method of cotton expansion is the extension of cotton cultivation into nonirrigated areas. Nonirrigated, dry-farming land of Turkestan is beginning to be utilized on a small scale for cotton; but of far greater importance is the strong effort made during the last two years to develop cotton growing in European Russia, particularly in north Caucasus, Ukraine, and Crimea where cotton was not cultivated previously except on an experimental scale. In 1931, the new cotton areas already accounted for 17 per cent of the total Russian cotton acreage. It is too early to say whether this experiment is really a success. Difficulties are likely to be encountered, especially in view of the extension of cotton cultivation far northward. In any event, the yields are bound to be lower than on the irrigated lands of Turke-

stan and Transcaucasia.

During the last few years the Union of Soviet Socialist Republics exported small quantities of cotton although the country was on an import basis. These exports were probably dictated by financial exigencies of the balance of international payments. Under a monopoly of foreign trade and the textile industry, sales of the better cotton for the purpose of obtaining foreign currency are likely to occur and may even increase in the future, notwithstanding a short supply of cotton. With Russian exports and Russian imports of cotton the foreign exchange situation is an important factor. In the long run, however, whether the Union of Soviet Socialist Republics will be self-sufficient with respect to cotton, or on an import basis, or (much more problematical) will develop a considerable export surplus of cotton, is likely to be determined largely by the outcome of a race between the standard of living of the Russian population and the capacity for increased cotton production.

L. Volin, Bureau of Agricultural Economics.

OTTON Fiber Improvement
Necessitates Community
Action to Keep Seed Pure

The sexuality of plants and the conveyance of pollen by insects have been studied intensively for the past century, and many curi-

ous relations have been revealed. Since the time of Darwin hundreds of floral specializations to attract insects have been described in the

different families of plants, and insects have been found to be carriers not only of pollen grains but of fungus spores, bacteria, and other microscopic organisms that cause epidemic diseases, such as malaria, yellow fever, typhoid fever, and bubonic plague. Sanitation of seed stocks is necessary in the cotton industry, in order to produce better fiber.

The floral biology of the cotton plant is relatively simple. The flowers are conspicuous, with nectar glands at the base. The large tuberculate pollen grains have their surfaces covered with mucilage and are not carried by the wind, but adhere readily to bees and other insects. (Fig. 28) Each flower is likely to be visited many times, and bees may come from a mile away. If the trails of the insect visitors could be visualized, the cotton fields of any community would appear to be completely covered and connected by a network of cross pollmation. Different breeds of cattle can be fenced in separate



Frouri 28—When several varieties of cofton me planted in neighboring fields bees and other insects that visit the flowers cross fertilize and mongrolize the different sorts. This results in deterioration of the seed stocks and the production of inequilar fiber of poor quality. (About natural size)

pastures, but there is no way to keep cotton from being crossed.

Where different varieties are raised in the same community an extensive mixing of seed occurs at the public gins. When this mixed seed is used the work of the bees in crossing the different plants in the fields is a mongrelizing process, leading to an indiscriminate diversity of plant characters and a corresponding irregularity of fiber. (Fig. 29.) Hybrids between different varicties may appear promising in the first generation, but "break up" and degenerate in second and later generations.

Mixing and crossing undoubtedly have increased with the development of the public-gin system since the Civil War. A general deterioration of the fiber has occurred, and now has reached the point at

which cotton from other countries to some extent is replacing American cotton in Europe.

# More Uniformity of Fiber is Greatest Need

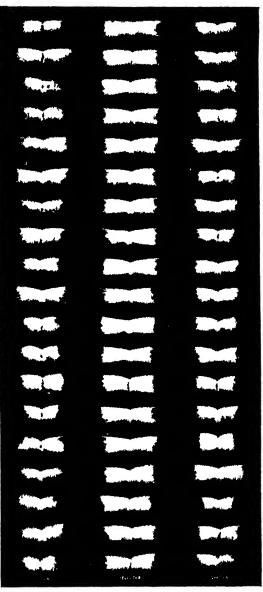
Since the cotton fiber has to be spun by accurately adjusted textile machinery, making the fiber more uniform is the greatest improvement that can be accomplished by selective breeding. Varieties with fiber of any desired length, from ½ to 2 inches, can be produced. Fiber less than 1 inch long is "short staple," which should in general be replaced by uniform varieties with staples 1 inch or more in length. The longer the fiber the greater the need of care in maintaining the uniformity of the seed stocks, if production is to be on a practical scale. For-

merly it was supposed that the discovery or development of better varieties of cotton would bring an improvement of the fiber, but experience

shows that the practical possibilities of improvement depend on establishing good varieties in regular, continued cultivation.

On account of the effects of mixing and crossing, the production of uniform cotton depends on isolating the seed stocks of the varieties. Instead of growing different varieties in the same localities, each community or district that undertakes to produce uniform cotton must restrict itself to a single superior variety, in order that the variety may be preserved by keeping the seed pure. tinued selection and roguing also are required in order to maintain a uniform type, but these precautions are of little effect if the seed stocks are not isolated.

The first step in practical improvement of cotton fiber is to provide the 1-variety conditions for maintaining the necessary supplies of pure seed. The crop must be varietized by communities before the fiber quality can be standardized effectively, that is, before the fiber can be made as uniform as possible, and kept uniform from year to year, during a period of commercial



kigt Ri 29—Center row shows uniform cotton produced from pure selected seed. First and third 10%s show irregular fiber grown from seed of different varieties that have been mixed at the gins and mongrelized in the fields by insects. (One fourth natural size)

production. The methods of preserving and utilizing superior varieties are a part of the problem of fiber improvement, no less than the methods of breeding and selection.

### Better Buying System Needed

Nobody knows how much cotton of more than 1-inch staple would be used, or how much advantage uniform fiber would have in the market, if adequate supplies were regularly available, as has never been the The annual production of sea-island cotton in South Carolina, Georgia, and Florida once ranged for many years from 70,000 to 100,000 bales, and several times as many bales of upland long-staple cotton were grown in Mississippi, Louisiana, and eastern Texas. With the arrival of the boll weevil, not only were these crops of long-staple cotton destroyed and the long-staple varieties discarded, but several of the former long-staple markets were abandoned. The tendency that has ruled in recent years, not to discriminate in the quality and price of cotton in primary markets, has stood in the way of improvement of the fiber. Even the slight premiums necessary to encourage planting early and productive varieties with uniform moderate-length staples have often been refused to the farmers, thus discouraging the planting of good varieties and the taking of precautions necessary to keep the seed pure. Hence it is being recognized that the system of buying must be improved, as well as the system of production, in order to improve the fiber.

O. F. Cook, Bureau of Plant Industry.

OTTON Growers Advised Not to Try Large-Scale Planting of Sea-Island Sea-island cotton, when grown from pure selected seed, is the most valuable of the world's cottons. It is a cotton de luxe with a silky staple

from 1½ to 2½ inches long, surpassing all other types in length, strength, and fineness of fiber. For the manufacture of sewing thread, laces, fine dress goods, and for woven fabrics combining extreme lightness with maximum strength and durability, such as airplane wings, balloon and parachute cloth, gas cells for dirigibles, etc., sea-island cotton is liter-

ally in a class by itself among the world's cotton fibers.

Commercial planting of sea-island cotton is now confined almost entirely to Porto Rico and other islands of the West Indies. The present total annual production is less than 10,000 bales, and practically all of this crop represents fancy grades with staples 1% inches long and upward. The longest sea-island cotton is now grown in St. Vincent, British West Indies, where staple up to 24 inches and longer is produced from seed of one of the fancy "crop lot" strains imported from South Carolina.

# Former Production About 90,000 Bales Annually

Before the invasion of the boll weevil into the Southeastern States, where the sea-island cotton was formerly grown, the average annual production of this cotton was about 90,000 bales. About one-tenth of this production represented fancy grades with fiber from 1% to 2% inches long, the bulk of the crop ranging from 1½ to 1% inches in length. After the invasion of the weevil, production of sca-island cotton in the Southeastern States rapidly declined and about 10 years ago was practically abandoned.

Anticipating the serious danger of losing the seed stocks, which had been developed through more than 100 years of careful breeding and selection, experiments were immediately undertaken by the United States Department of Agriculture in cooperation with the Agricultural

Society of South Carolina and interested growers on the Sea Islands, to investigate the practical possibilities of producing sea-island cotton under boll-weevil conditions and at the same time to preserve a stock of planting seed, should interest be revived in this cotton in later years.

The experiments included studies of the possibilities in cultural control of the weevils by the improved method of "thick" spacing of the plants in the rows to produce earlier and larger crops; fertilizer tests; and other forms of production improvements, as well as the breeding of earlier strains, and use of the methods of direct protection of the crop by poisons (Fig. 30.)

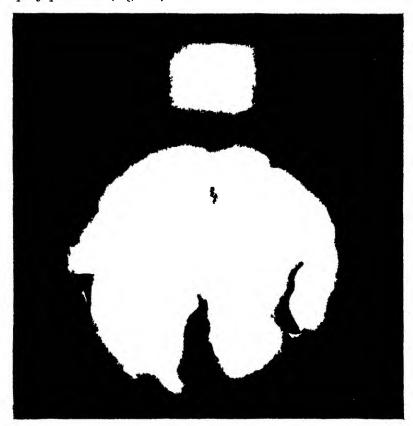


FIGURE 30 - Upland cotton boll. (Natural size) Compare with sea-island boll

# Exclusion of Other Types Necessary

By experimental plantings over a period of more than 10 years, it has been fully demonstrated that sca-island cotton can not be successfully grown under the old system of mixed-variety planting with upland cotton, as formerly practiced by the growers in the mainland districts of Georgia and Florida. Unlike the upland varieties, sca-island cotton is susceptible to serious damage from boll weevils during the entire period of development of the crop, and weevils bred in the flower buds of the earlier upland short-staple cotton usually prevent the setting of a crop on the later maturing sea-island plants.

Experience has shown that the only possibility of successful production under present conditions is in communities or districts devoted entirely to the planting of sea-island cotton, to the complete exclusion of any other variety or type.

In the absence of supplies of sea-island fiber, the American market for this cotton completely disappeared several years ago, and the



FIGURE 31—See-island cotton boll (Natural size) It costs several times as much to pick the small bolls and roller gin the sea-island cotton as it does for upland cotton

problems of restoring a satisfactory outlet for the fiber, if and when it is produced, are equally important with the problems of production. (Fig. 31.) A regular supply of the sea-island fiber must be assured in order to reestablish an American market, and, by the same token, a fair price for the fiber must assured to the growers in order to encourage organized effort to establish isolated sea-island communities where the seed can be kept pure and the quality of the fiber maintained.

### Planting of Sea-Island Not Advised

Intensive studies of these and other fundamental problems of production are being made by the department in cooperation with growers and manufacturers. At

present, satisfactory market arrangements have not been worked out with manufacturers, and until more information is available, farmers are being advised not to plant sea-island cotton on a large scale anywhere in the continental United States.

C. B. Dolle, Bureau of Plant Industry.

COTTON Progressively Lowered in Grade by Exposure, Tests Show Weather and exposure lower the grade of cotton. Every cotton farmer knows this and tries to pick his cotton under the best conditions as soon as possible

after the bolls are ready. How much change takes place with exposure, and what kind of change, has never been known.

The universal standards for grade of American upland cotton recognize five color classifications which are put up in physical form, Extra White, Blue Stained, White, Yellow Tinged, and Yellow Stained, and three descriptive classes, Gray, Spotted, and Light Stained. Within each class there is a wide range of color variation, as in the white grades in which the color varies from the very light creamy cottons of Good Middling and above to the dark spotted cottons included in Good Ordinary.

In order to make a preliminary survey that would reveal something about these different colors, what caused them, how stable they are, and other characteristics, a study was undertaken in the 1930 season on cotton grown at the South Carolina Experiment Station at Clemson

College. The study was limited to the factor of exposure.

The method of procedure was: In September, when the cotton was opening profusely, a great many newly opened bolls were tagged for future consideration. A certain number of these tagged bolls were picked on the date of tagging and at regular intervals for several days,

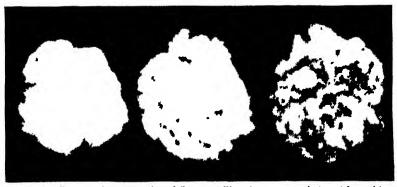


FIGURE 32—Exposure alone causes these differences—The cottons were ready to pick by mid-September. The samples illustrated were picked during the latter part of September, the middle of December, and the first of March

then daily for approximately two weeks, and weekly thereafter as long as there were tagged bolls remaining on the stalks. This provided a series of the same cotton, grown in the same field, under identical conditions. (Fig. 32.)

#### Definite Color Trend Shown

The samples were small, hand picked, and hand ginned, yet they provided excellent material for a study of the actual fiber color change. Although they are not entirely representative of grade since they contain so little trash, yet the grade given to them by Government classers lowers regularly from the first to the last of the season and follows the same trend that would take place in the classification of commercial samples. During the first two weeks after tagging, all of the samples graded Strict Good or Good Middling White or Spotted. The last sample to grade in the White grades was picked on the eighteenth day after tagging. From that time on the samples graded progressively through Good Middling Spotted, Good Middling Gray, Strict Middling Spotted and Strict Middling Gray, Good Middling Blue, Middling Spotted, Strict Middling Blue, Strict Low and Low Middling Spotted, and finally became so low in color that they could not be

graded against the standards. Measurements of the color of these cottons show a very definite trend from light, somewhat creamy cottons of the high White grades down through the Grays to the low-grade Blue cottons. The spots which caused some of the higher grades to fall into Spotted classifications seemed to be of different origin from those of the low grades, the general background color of the low grades being gray or blue even though they were called Spotted cottons. The measurements showed that the cottons picked after the middle of January were so low that there are no equivalent grades for them.

This study covers only one eastern cotton under weather conditions of 1930-31. Cottons from several sections of the Cotton Belt were studied in 1931, with many additional laboratory tests made upon them in order to discover correlated factors; that is, as the grade deteriorates by exposure, what other changes in characteristics occur that

affect the spinning utility of the cotton.

It is a significant fact that exposure in the field for only two or three weeks after the bolls first open will lower the grade of the cotton.

DOROTHY NICKERSON, Bureau of Agricultural Economics.

OTTON Root Rot Causes Great Loss in Southwest; Control Problem Unsolved During recent years, studies in Texas and Arizona have resulted in an increased knowledge of the habits and life history of the cot-

ton root-rot fungus (Phymatotrichum omnivorum (Shear) Duggar) which



FIGURE 33—Characteristic appearance of a cotton plant dying from effects of the root-rot fungus

causes the serious rootrot disease in these and other Southwestern States. (Fig. 33.) The disease is most prevalent in Texas, where it causes losses cstimated at \$100.000-000 annually. It is also responsible for serious losses in parts of Oklahoma, Arkansas, New Mexico, Arizona, southern California, and northern Mexico.

The disease attacks not only cotton but alfalfa and many important field crops, vegetables, fruit and shade trees, berries, and ornamental plants. (Fig. 34.) Texas investigators have listed 274 species of cultivated plants and about

350 noncultivated species which serve as hosts of the fungus. The root-rot fungus is undoubtedly native to most of the areas where it occurs, as it is found on wild plants remote from cultivation, and



FIGURE 34 - 1 pist who tree killed by the cotton root-rot fungus near Indio, Culif.

often appears in the first crops planted on virgin soils. There is no evidence that the disease is disseminated by such agencies as farm implements, animals, wind, or irrigation water, but it may be transmitted by the transfer of infected plants or sclerotia. It usually persists in the same areas for many years.

The growth of the fungus is entirely subterranean except when it is producing fruiting bodies, and all of the direct injury is to the roots of plants. The fungus spreads by sending out numerous fine filaments, which advance among the soil particles. Some of these develop into strands which convey food materials for the extension of growth, (Fig. 35.)

## Irregular Cycles of Activity

Maps prepared over a period of several successive years from careful measurement of root-rot spots in cotton fields show irregular



Figure 35 – A thizomorphic type of strind of the cotton root-101 fungus obtained from the soil beneath a spore mit (<6)

ycles of expansion and recession in the activity of the fungus. Some pots that have shown regular bands of new growth each year for everal seasons may break up and leave only a few centers of infection within the invaded area. From these new growth takes place, and as xpansion continues in later years, the spots may resume the same

FIGURE 36—Science of the cotton root-rot fungus developing in Jais containing sand and cotton roots (X 1½)

contours as they formerly had.

The root-rot fungus is known to have three stages of development in its life history. These are the Ozonium or vegetative stage, the Phymatotrichum or conidial stage, and the sclerotial or resting The conidial stage appears as cushions or mats of spores on the surface of the ground, under special conditions of shade and moisture. The mats are white in color when first developed, but turn buff as they grow older, and in the later stages break down into a brownish powdery mass of conidia. The spores do not germinatereadily, and there is no evidence that they can cause infection. The sclerotial stage develops in the soil in the form of swellings or nodular enlargements of the strands. (Fig. 36.) The sclerotia vary in

size and shape, some being small rounded bodies like mustard seed and others attaining the size of small peas. Chains or clusters of sclerotia are also sometimes formed, and may be three-fourths of an inch or more in diameter.

The sclerotia are either scattered or grouped in the soil, and have been found at depths of from 3 to 92 inches. A cubic foot of soil may contain as many as 4,000 to 5,000. Under favorable conditions they germinate readily and are capable of infecting plants. Sclerotia were found to be viable after being kept in soil under laboratory conditions for two and one-half years, and it is indicated that they may live at least that long under

some conditions in the field. They are readily killed by disinfectants and by exposure to drying, but live for a long period in moist soil or submerged in water.

### No Entirely Satisfactory Control Measure

None of the control methods that have been tried are entirely satisfactory. Clean fallowing, repeated applications of barnyard manure over a period of several years, and subsoiling combined with rotation with nonsusceptible crops were effective in reducing the extent of the disease in some experiments. In some sandy soils it has been demonstrated that disinfectants such as formaldehyde, when applied by check flooding or by injection methods, were effective in destroying the fungus in both its vegetative and sclerotial stages. Barriers in the form of open trenches, sheet metal, or mixtures of soil with fuel oil or sulphur were found to limit the spread of the fungus. Applications of commercial fertilizers hastened the maturity of the cotton crop and increased the yield in some infested areas, but did not greatly influence the extent of infestation. Repeated attempts have been made to breed a strain or variety of cotton that would be resistant to root rot, but the results have been rather discouraging. More promising results were obtained in testing for resistance some of the fruit trees and ornamental plants.

C. J. King, Bureau of Plant Industry.

Must Be of the Proper Temperature and Age

REAM to Whip Readily Whipped cream is generally considered an appetizing delicacy only, but it is a valuable food as well. No other dairy product is used so extensively

as a basis for desserts or to garnish them. Likewise, in all probability, no other dairy product gives more trouble to both dealer and customer. The housewife often is disappointed when, after she plans the meal, the cream fails to whip. This means complaints to the dealer supplying the cream, who in turn must go to the trouble of finding out why the cream failed to whip and must attempt to satisfy the customer.

When cream fails to whip, the first thought is that it does not contain a sufficiently high percentage of butterfat. This is rarely the case nowadays, for practically all the dairies are supplying their trade with whipping cream containing 30 per cent or more of butterfat. Cream with this percentage of butterfat will give a satisfactory whip if properly handled.

It is true that raw cream gives a slightly better whip than does pasteurized cream of the same fat content. The difference, however, is not great. It is well to consider the source of the cream, and if there is any doubt as to its sanitary quality, pasteurized cream should be selected because of the added factor of safety to human health.

Most of the trouble with whipping cream could be avoided if the importance of temperature were more generally realized. There is no other single factor which causes as much trouble with whipping as the temperature at the time of whipping. For success in whipping, the cream should be whipped at a temperature below 50° F. Many times, even when the cream has been stored at a low temperature, it is brought

into a warm room, poured into a warm container, and then whipped with a warm beater. Under such conditions the temperature of the cream may rise several degrees, and its whipping ability often becomes so greatly impaired that it fails to whip. If the housewife will remember the importance of temperature during the process and have the cream cold and all utensils chilled, she will avoid many disappointments, and there will be fewer complaints received by dairies supplying whipping cream.

#### The Age Factor

When cream is separated for home use, it is well to bear in mind that age is an important factor in whipping cream. Cream which fails to whip when fresh often develops into an excellent whipping cream when aged at a temperature sufficiently low (45° F.) to prevent the rapid formation of acidity. Care must be used, however, in aging cream. If the temperature exceeds 50°, the cream may become sour before the desired effect of aging takes place. It may also develop off flavors unless it is aged under ideal conditions free from odors.

The time required for aging varies with the butterfat content. However, if the cream contains 30 per cent or more butterfat, the greatest effect will take place during the first 12 hours of aging, and at approxi-

mately 36 hours the maximum ability to whip is approached.

Therefore, in selecting a whipping cream it is important to select one that is at least 12 hours of age and contains 30 per cent or more of butterfat. Then if the cream is properly handled and kept at a temperature of 45° F. or lower before and during the whipping process, most whipping-cream troubles and disappointments will be over.

C. J. BABCOCK, Bureau of Dairy Industry.

Proved Sires Increase
Output of Daughters

Purebred Holstein-Friesian and Jersey bulls that have shown the ability to transmit to their daughters the capacity for uniformly high milk and butterfat

production have been constantly in service at the experimental farm of the Bureau of Dairy Industry at Beltsville, Md. Sons of these proved sires have been placed with dairy farmers and institutions in Maryland and Virginia for use as herd sires on condition that the farmers raise all daughters of these bulls and furnish satisfactory production records on their herds. Sufficient data on the productive ability of the daughters of some of these bulls are now available to determine

their transmitting ability.

Of the bulls used in this cooperative work, 14 are sons of 4 unrelated, proved Holstein-Friesian sires, and 12 are sons of 5 proved Jersey sires. These 26 sons were mated both to purebred and grade cows and have sired 257 daughters. The Holsteins have 181 daughters and the Jerseys 76 daughters with completed records. Most of the daughters and dams were tested through dairy herd-improvement associations and were handled under average farm conditions. Both daughters' and dams' records in Tables 2 and 3 have been calculated to maturity by applying the factors prepared in the Bureau of Dairy Industry. All of the daughters' records were made during the first lactation period, while those of the dams were made during various lactation periods.

The average production records of the daughters and of the dams of the daughters are shown in Tables 2 and 3. Only those sires having three or more daughters are considered in this tabulation.

Table 2.—Average production records of daughters of 14 Holstein-Friesian bulls each having three or more daughters, compared with the records of the dams of the daughters

Sire No.	Daugh- ters and dams	Daughters			Dams of daughters			Increase or decrease of daughters over dams	
		Milk Butterfat		Milk	Batterfat		Milk	Butter- fat	
815	Num- ber 4 13 34 6 6 20 3 31 1 5 5 5 10 5 8 3	Pounds 11, 053 10, 522 14, 022 11, 908 9, 785 11, 920 15, 710 9, 780 9, 414 11, 042 8, 968 8, 656 14, 456 10, 378	Per cent 3.38 3.76 3.26 3.60 3.31 3.60 3.32 3.80 3.22 3.80 3.22 3.50 3.40 3.31	Pounds 373. 7 396. 1 456. 7 435. 8 323. 9 431. 0 523. 5 354. 0 356. 0 356. 0 303. 0 501. 0 344. 0	Pounds 7, 807 7, 447 11, 8662 7, 892 11, 159 12, 584 9, 191 7, 485 9, 647 13, 345 10, 170	Per cent 3 74 3 .90 3 .89 3 .54 3 .57 4 .18 3 .56 3 .57 3 .38	Pounds 292, 2 291, 0 337, 7 279, 4 398, 0 299, 0 305, 0 327, 0 257, 0 339, 0	Pounds 3, 246 3, 075 2, 216 3, 286 1, 893 761 3, 126 2, 120 1, 851 1, 483 1 —991 1, 111 208	Pounds 81. 5 105. 1 98. 1 44. 5 33. 0 55. 0 59. 0 1 —30. 0
181 daughters and dams average 87 daughters and dams average 181 daughters average		12, 465 10, 122 12, 465	3. 55 3 40	359 6 423. 8	10, 273 8, 194	3, 69	302. 1	2, 192 1, 928	37. 3

<sup>&</sup>lt;sup>1</sup> Minus sign indicates decrease.

Table 3.—Average production records of daughters of 12 Jersey bulls each having three or more daughters, compared with the records of the dams of the daughters

Sire No.	Daugh- ters and	Daughters			Dams of daughters			Increase or decrease of daughters over dams	
	dams	Milk	Butterfat		Milk	Butterfat		Milk	Butter- fat
517-M. 527-M. 537-M. 644-M. 563-M. 579-M. 538-K. 548-K. 549-K. 550-B. 577-T. R.	87587 57	Pounds 10, 271 5, 962 7, 226 8, 348 6, 354 5, 397 8, 869 8, 223 6, 311 6, 911 8, 996	Per cent 5. 13 5. 19 5. 52 4. 90 4. 92 5. 08 4. 39 5. 01 4. 79 5. 68 5. 10	Pounds 527. 0 309. 2 399. 0 410. 0 312. 0 275. 0 389. 5 412. 0 302. 2 373. 0 392. 4 459. 0	Pounds 9, 543 5, 239 6, 015 10, 152 5, 873 5, 496 6, 745 6, 761 4, 957 5, 514 7, 702	Per cent 4.84 4.96 5.07 8.98 4.76 4.45 4.49 5.17 4.78 5.34 5.37	Pounds 462.0 259.8 305.3 404.0 279.0 244.0 301.0 357.0 323.0 264.7 298.0 367.3	Pounds 728.0 723.0 1, 211.0 1 -1, 804.0 481.0 1 -99.0 2, 124.0 1, 309.0 1 -451 0 1, 864.0 1, 387 0 1, 294.0	Pounds 65.0 49.4 94.0 6.0 33.0 31.0 88.5 55.0 1 —21.0 109.1 94.4 92.0
76 daughters and dams av	erage	7, 716	5.04	390. 7	7, 030	4.74	333. 3	716. 5	57. 4

<sup>&</sup>lt;sup>1</sup> Minus sign indicates decrease.

### Yearly Production Averages

The average yearly production of the 181 Holstein daughters when calculated to a mature basis is 12,465 pounds of milk, as compared with 10,273 pounds of milk for their dams, an average increase of 2,192

pounds.

The average yearly production of the 87 daughters and dams having both milk and butterfat records is 10,122 pounds of milk, and 359.6 pounds of butterfat, as compared with 8,194 pounds of milk, and 302.1 pounds of butterfat for their dams, an average increase of 1,928 pounds of milk, and 57.5 pounds of butterfat.

The average yearly production of the 76 Jersey daughters when calculated to a mature basis is 7,746 pounds of milk, and 390 7 pounds of butterfat, as compared with 7,030 pounds of milk and 333.3 pounds of butterfat for their dams, an average increase of 716.5 pounds of milk

and 57.4 pounds of butterfat.

When the individual milk-production records of the 181 Holstein daughters were compared with the records of their dams it was found that 150 exceeded their dams in milk. Of the 87 daughters and dams having both milk and butterfat records, 68 daughters exceeded their dams in milk, 71 in pounds of butterfat, and 33 in per cent of butterfat.

When similar comparisons were made of the 76 Jersey daughters and their dams, 48 daughters exceeded their dams in milk, 58 in pounds of

butterfat and 50 in per cent of butterfat.

It will be noted in Tables 2 and 3 that 22 of the 26 sires have daughters that show an increase in average milk production over that of their dams, and that 24 of these sires have daughters that show an

increase in both milk and butterfat production.

The value to dairy farmers of this increased production based on the average price of milk for 1930, paid to producers in the region where these bulls were used, would amount to \$70.14 per cow per year for the Holstein group, and \$31.17 per cow per year for the Jersey group. The total value of the increase in production for two groups is \$15,064.26 per year.

While the increase in production derived from the daughters of sons of proved sires commands the dairy farmer's attention, it also reveals the fact that the chance of obtaining unprofitable daughters is greatly

lessened when sons of proved sires are used.

C. J. STAUBER, Bureau of Dairy Industry.

AIRY Cows Fed More Economically If Grain Is Properly Apportioned

The proper and economical feeding of the dairy cow consists in providing all the feed nutrients she requires, not only in the form best adapted

for her use but also at the lowest cost and without waste. This requires that she be fed all or nearly all the good roughage she will eat and in addition, except for a few weeks immediately after calving, enough grain of suitable protein content to meet her requirements for milk production and for maintaining her body with no loss of weight and with only a small gain. The nutrients needed to meet these requirements will be supplied with a fair degree of accuracy if the feeder follows one of the commonly used feeding standards.

When the dairy cow is not on pasture, the usual method of feeding is to give her all the roughage she will consume in the form of hay, or

hay and silage, or hay and roots, together with 1 pound of grain for each 3 or 4 pounds of milk she produces, depending upon the richness of the milk and somewhat upon the quality of the roughage. This usual method of apportioning grain is inaccurate for two reasons: (1) Because cows will get enough nutrients from good roughage alone to provide for the maintenance of their bodies as well as for the production of a certain quantity of milk; and (2) because 1 pound of grain does not contain sufficient nutrients to produce as much as 3 pounds of milk. The use of this method, therefore, results in the feeding of too much grain to low producers and the feeding of too little grain to high producers. The low producers get fat because they are overfed. The high producers not only get thin as a result of underfeeding, but their milk production declines rapidly to a point at which the nutrients provided are sufficient for the milk produced.

### Feeding Tests at Beltsville, Md.

In order to develop a method of accurately apportioning grain to dairy cows, investigations were undertaken at the United States Dairy Experiment Station of the Bureau of Dairy Industry at Beltsville, Md. It was found necessary: (1) To determine how much hay cows of different breeds and sizes would consume when given all they would eat along with a definite quantity of silage; (2) to calculate the pounds of milk for which this quantity of hay and silage would provide nutrients, at the same time maintaining the weight of the cow; and (3) to determine by means of actual feeding trials how much grain is required to provide nutrients for the additional milk produced, and to keep the cows gaining slightly in weight.

The data on roughage consumption were obtained for Holstein and Jersey cows fed 3 pounds of silage per day per 100 pounds live weight, and in addition, all the No. 2 or No. 3 alfalfa hay they would eat. It

was found that:

(1) Large cows ate more roughage than small cows.

(2) Both large and small cows ate roughage in excess of their maintenance requirements.

(3) The extra roughage eaten by large cows, above maintenance requirements, was more than the extra roughage eaten by small cows.

(4) Jerseys and Holsteins of the same size ate about the same quan-

tity of roughage.

Calculating the maintenance requirements on the basis of the Savage feeding standard, it was found that the small cows ate about 8 pounds of hay a day more than they required for maintenance, while the large cows ate about 10 pounds of hay more than the quantity required for maintenance. It was also estimated from the Savage feeding standard that the nutrients in 8 pounds of hay would be ample for the production of 10 pounds of Jersey milk, while 10 pounds of hay would provide nutrients for at least 16 pounds of Holstein milk.

It is assumed, therefore, that if cows are fed silage and all the No. 2 alfalfa hay they will eat, only those producing more than the quantities specified will require grain. For the production of milk above these quantities, 0.6 pound of a grain mixture in which one-half of the ingredients are of a bulky nature, as ground oats or wheat bran, will provide the nutrients required for 1 pound of average Jersey milk on the basis of the feeding standard, while 0 4 pound will suffice for 1

pound of average Holstein milk.

#### Method Tried for Three Winters

This method of feeding was given a practical trial at the Beltsville experiment farm for three winters. Altogether 40 Jersey cows were fed for a total of 162 cow-months; and 31 Holsteins for a total of 83 cow-months. The quantity of grain fed was adjusted on the first of each month according to the quantity of milk being produced at that time. The hay was mostly No. 2 alfalfa, and the corn silage was of average quality. The grain mixture was composed for the most part of 100 pounds of hominy feed, 100 pounds of ground oats, 100 pounds of wheat bran, 50 pounds of cottonseed meal, 50 pounds of linseed meal, and 4 pounds of salt. This mixture analyzed on the average about 19 per cent total protein. The efficiency of this method was measured by the rate of decline in milk production and by the condition of flesh in which the cows were maintained.

In these feeding trials, the Jersey cows averaged 970 pounds in weight and gave 22 5 pounds of milk a day testing 5.25 per cent; the Holstein cows averaged 1,210 pounds in weight and gave 36.5 pounds of milk testing 3.4 per cent. From the first to the last of each month, the Jerseys declined in milk production an average of 9.3 per cent, and gained 5 2 pounds in body weight; while the Holsteins declined an aver-

age of 8.5 per cent and gained 6.9 pounds in body weight.

The average daily ration for the Jerseys was 7.3 pounds grain, 12.7 pounds hay, and 27.6 pounds silage; that for the Holsteins was 8.5 pounds grain, 17 pounds hay, and 35.4 pounds silage. Based on average feed analysis, the Jersey cows ate 1.9 per cent more nutrients than required by the Savage standard, while the Holsteins ate 4 6 per cent more. The Jerseys consumed 20.2 per cent more protein than called for by the Savage standard, while the Holsteins consumed 17 5 per cent more. Perhaps a grain mixture containing a little smaller percentage of protein would have been just as satisfactory.

This method of feeding proved satisfactory since in general there was a small gain in live weight and the decline in milk production was no

larger than normal.

Table 4 shows the average daily quantities of grain actually apportioned to cows giving different quantities of milk, compared with the quantities of grain that would have been fed by the common method of apportioning grain at the rate of 1 pound for each 3 pounds of Jersey milk or each 4 pounds of Holstein milk produced.

Table 4.—A comparison of the quantities of grain actually fed to Jersey and Holstein cows with the quantities called for by common feeding practices

	Tersey cow	4		Holstein cows					
Milk produced daily Gra			portioned	Milk produced	daily	Grain apportioned daily			
Range	Average	Quan- titles actually fed	Quan- titles called for by common method	Range	A verage	Quan- titles actually fed	Quantities called for by common method		
Pounds 40 1-41 2	Pounds 40 7 31 3 24 8 15 1 8 1	Pounds 17 6 13 1 5 4 3 1 0	Pounds 13 6 11 1 9 3 5 0 2 7	Pounds 60 1-74 2	Pounds 66 9 52 3 45 1 34 1 24 0 15 3	Pounds 22 5 14 7 11 6 7 6 3 2 . 1	Pounds 16 7 13 1 11 3 8 6 6 0 3 8		

When the cows were grouped by breeds according to the quantity of milk they were producing, it was found that except for a few of the highest producers, most of which had been fresh only a short time, the cows ate enough nutrients to meet their requirements, and the few high producers failed by only a small margin; the highest producers lost some weight, while the remainder of the cows in most cases made satisfactory gains in weight; the declines in milk were about such as would be normally expected.

#### Waste is Prevented

This new system of apportioning grain appeared, under the conditions of the experiment, to provide the nutrients required without waste, for both high-producing and low-producing Jersey and Holstein cows in all stages of lactation. This method may be applied in a like manner to other dairy breeds. To obtain comparable results it appears that, when roughages similar in kind and quality are fed, Guernseys should receive grain at the rate of 0.55 pound daily for each pound of milk produced above 12 pounds, while Ayrshires and Brown Swiss should receive 0.45 pound of grain daily for each pound of milk produced above 14 pounds.

This method is not presented with the idea that it will apply to all conditions. In general, it does seem to apply where cows are fed from 2 to 3 pounds of fair-to-good quality of silage daily per 100 pounds live weight, along with all they will consume of No. 2 or No. 3 alfalfa or soybean hay, No. 1 or No. 2 clover and timothy, or other mixed legume and nonlegume hay, or No. 1 timothy or other grass hay of the highest quality. It is necessary, however, to adjust the percentage of protein in the grain mixture so that it will properly supplement the kind of

roughages fad.

Roughages fed of lower quality than those indicated will provide less digestible nutrients above maintenance requirements for milk production, and more grain will be required. Roughages of higher quality than those indicated will make available more digestible nutrients above maintenance requirements for milk production, and less grain will be required. Feeding trials at department and State experiment stations show that cows receiving all the highest-quality legume hay they will eat (particularly alfalfa), either with or without silage, will consume sufficient roughages to provide nutrients for considerably larger quantities of milk than were obtained from the above tests. The Bureau of Dairy Industry now has feeding trials in progress to ascertain what quantities of high-quality legume hays dairy cows will consume, in order to determine how large a production of milk such roughage will provide nutrients for, in addition to the cows' maintenance requirements.

J. B. Shepherd, Bureau of Dairy Industry.

ASSOCIATIONS Complete Twenty-Five Years' Work A dairy herd-improvement association is an organization of dairy farmers who cooperatively employ a tester to determine the amount

of milk and butterfat produced by every cow owned by the members and to compute the cost of production. The records thus obtained serve as a basis for determining the kinds and amounts of feed to be fed for economical production and to indicate the cows that do not respond profitably to proper feeding and care. Attention is also given to the rearing of young stock and the selection of herd sires. Members of many associations also cooperate in selling their dairy

products and in buying farm supplies.

The first association in the United States was organized in Newaygo County, Mich., in 1905, and began work in January, 1906. According to the census of 1900 the average production of butterfat per cow in the United States was 145 pounds per year. At the completion of one year's operation the Newaygo County Association found that the 239 cows completing a year's record averaged 215 pounds of butterfat per cow, or 70 pounds above the average for all cows.

This was very encouraging and the keeping of dairy records gradually spread to other parts of Michigan and to other States as well. By 1910 there were 64 associations in 11 States. In 1915 the work covered 25 States with 346 associations. In 1925 there were 777 associations in active operation, and on January 1, 1931, there were 1,112 associations in 45 States with more than half a million cows on

test.

Not only had the number of associations increased, but the average

production of the cows on test had increased.

Compared to the first year's average of 215 pounds in the Newaygo County Association the average of 452 associations in 1920 showed a gain of 32 pounds of butterfat per cow. In 1925 the average was 284 pounds. In 1930 the average for more than half a million cows on test was 302 pounds per cow, a gain of 87 pounds during the 25 years of record keeping.

#### Associations Have Wide Influence

Although the number of cows on test represents only a small percentage of all dairy cows in the United States, the influence of the dairy herd-improvement association program seems to have extended beyond the membership of the associations, for the general average of all cows has been raised from 145 pounds of butterfat per cow in

1900 to 180 pounds in 1930.

When the association work began it consisted chiefly of furnishing records as a basis for the elimination of low-producing cows. As the work progressed, other factors for herd improvement were added—such as feeding according to production, making a better and more economical selection of feeds, giving more attention to breeding dates, and finally making it possible to check up on the herd sire through the production records of his daughters:

The member of a dairy herd-improvement association who takes advantage of all the factors that are now available in association work

has his enterprise on a sound business basis.

It can not be said that the dairy herd-improvement associations are entirely responsible for all of the general improvement of our dairy cows, but there is no doubt that the associations have contributed to this improvement, directly and indirectly, more than any other single factor.

The general plan of keeping feed and production records of dairy cows, cooperatively, originated in Denmark some 10 years previous to its introduction into the United States. At the present time there

are dairy herd-improvement associations in nearly every dairy country in the world. Denmark has 38.5 per cent of her cows on test, Finland 17.4 per cent, New Zealand 20 per cent, Scotland 18 per cent, and Canada 2.5 per cent. The United States with 23,000,000 cows has only 2.2 per cent on test.

However, if the average production of all the cows in the United States were equal to that of the 2.2 per cent now being tested in dairy-herd associations, it would require only about 14,000,000 cows to produce as much milk and butterfat as the 23,000,000 are now

producing.

J. E. DORMAN, Bureau of Dairy Industry.

AIRY Herd-Improvement Records Show Value of Increased Output Per Cow A study of the yearly individual records of 233,200 cows on test in dairy herd-improvement associations for the testing year ended

in 1930 shows that as production of milk per cow advanced from the lowest-producing groups to the higher-producing groups, the profits per cow increased at a very rapid rate.

Table 5 shows the comparative cost and returns of increaed production for the groups of cows whose average yearly milk production per cow was 4,000, 8,000, 12,000, and 16,000 pounds.

Group No.	Milk produc- tion per cow	Feed cost per 100 pounds of milk	Yearly feed cost per cow	Yearly income over feed cost per cow	Returns per dol- lar spent for feed
1	Pounds	Dollars	Dollars	Dollars	Dollars
	4,000	1 47	60 00	55, 00	1 92
	8,000	. 99	79 00	115, 00	2 46
	12,000	. 84	101 00	167, 00	2 65
	16,000	. 83	132, 00	239, 00	2, 81

TABLE 5.—Relation of milk production to other factors

The average feed cost for the group of cows that produced 4,000 pounds of milk per cow in one year's time was \$1.47 per 100 pounds of milk, while the feed cost for those that produced 8,000 pounds was 99 cents; for those that produced 12,000 pounds it was 84 cents, and for those that produced 16,000 pounds it was only 83 cents per 100 pounds of milk. In other words, as production per cow advanced from 4,000 pounds of milk to 16,000 pounds of milk, the cost of feed per 100 pounds of milk was reduced almost one-half. These figures give some idea of what may be saved in feed alone by increasing the production per cow. The dairy herd-improvement association figures do not give labor costs and overhead expenses, but the cost of labor and the expenses of overhead should not be much greater for the high-producing cow than for her low-producing sister.

#### Feed Costs Per Cow

While the feed cost per 100 pounds of milk went down from group to group as production increased, the yearly feed cost per cow went the other way. For the group whose average milk production was 4,000 pounds the yearly feed cost per cow was \$60; for the group averaging 8,000 pounds the average feed cost was \$79; for the group producing 12,000 pounds it was \$101, and for the group producing 16,000 pounds it was \$132. These figures indicate that a cow producing 16,000 pounds of milk in a year eats more than twice as much feed as the cow that produces 4,000 pounds. Yet her production is so much greater that in spite of the increased cost of feed she returns a much larger

yearly income over cost of feed.

The yearly income over cost of feed for the cows whose average milk production was 4,000 pounds was \$55 per cow. The group having an average milk production of 8,000 pounds returned \$115 in income over cost of feed. The group whose average production was 12,000 pounds returned \$167 in income over cost of feed, while the group whose average milk production was 16,000 pounds returned \$239 a year per cow in income over cost of feed. As it is usually considered that the feed cost of keeping the average cow a year is just about equal to the cost of labor and overhead, we may conclude that the cows having an average milk production of 4,000 pounds a year per cow just about paid for their feed, labor, and cost of overhead. In other words, they just about broke even. If that is true, it is safe to assert that all cows falling below the yearly production of 4,000 pounds of milk per cow in these dairy herd-improvement associations were actually carried at a loss and even in the dairy herd-improvement associations there are still many cows that fall below that low level of production.

# Returns Per Dollar Spent for Feed

Figures showing the returns per dollar spent for feed are quite significant. Table 5 shows that cows producing an average of 4,000 pounds of milk a year per cow returned \$1.92 per dollar spent for feed, while those that produced 16,000 pounds of milk per cow returned \$2.81 per dollar spent for feed. Low-producing dairy cows are not a good market for the feed grown on dairy farms, but high-producing dairy cows always constitute a good market for home-grown feeds.

Every dairyman should manage in some way to get production, feed cost, and income records of each cow in his dairy herd. He will find it profitable to study these individual cow records because they enable him to determine which cows should be kept and which should be discarded. Of all the figures in the table he will be most interested in the yearly income over cost of feed per cow. That figure means much more to him than the yearly cost of feed per cow or the returns per dollar spent for feed, because there can certainly be no profit until the returns pay for feed, for labor, and for overhead. To be sure, there are returns from the dairy herd other than those obtained from the sale of dairy products. For example, a certain value must be allowed for the manure and for the calf, but it costs something to haul the manure to the field and it costs something either to veal the calf or to raise it to production age. Therefore the dairyman would do well to step the production of his dairy herd up to the point at which the income from the sale of dairy products will pay all costs and leave a fair not profit.

J. C. McDowell, Bureau of Dairy Industry.

ATE Industry of U. S. is an Example of New, Noncompetitive Crop

Date palms have been growing in Florida, Texas, and California ever since the Spanish pioneers settled those regions, but unfortunately all

the early plantings were made by sowing seeds. About half of the seedlings were male palms, and only a few of the bearing palms yielded fruit of high quality. Nevertheless, seedling date palms made so good a showing in California, Arizona, and Florida that active interest in the date as a new fruit crop began to develop early in the eighties of the

last century.

In consequence of this interest the United States Department of Agriculture secured by correspondence offshoots of Old World date palms from Algeria, Egypt, and Arabia in 1889 and 1890 and sent them to California, Arizona, and New Mexico for testing in cooperation with the agricultural experiment stations of those States. Unfortunately these offshoots proved to be mere seedlings, mostly of little value. However, some of them made so rapid a growth and bore such abundant crops of dates that interest in them as a new fruit tree became still keener.

In 1900 a specialist of the United States Department of Agriculture went to the Algerian Sahara and selected several hundred offshoots of the choicest varieties grown there. These offshoots included a score of varieties, among them the famous Deglet Noor date, then and now the most highly esteemed date in the European markets. Most of these offshoots were planted in the Cooperative Date Garden at Tempe, Ariz., and a few dozen were sent to California in cooperation with the California State Experiment Station and with private growers. In the years immediately following (continuing to the present time) the Department of Agriculture made additional importations from the best Old World date regions, especially Mesopotamia, Persia, Beluchistan, Arabia, Egypt, Tunis, and Algeria. A cooperative date garden was established in California in 1904 and later another in Texas. Soon scores of the best date varieties of the Old World were growing vigorously in the hot, dry irrigated valleys of the southwestern United States.

# Climatic Requirements Indicated

A careful study was made in the Old World and in the New to determine as nearly as possible the life-history requirements and physiological limiting factors of the date palm. The findings were given wide publicity in order to prevent, in so far as possible, the loss of time and money that would result from planting date varieties in soils or under climatic conditions unsuited to them. These studies showed that the date palm required such a hot, dry climate to mature its fruit that large-scale commercial date culture was possible only in the hot irrigated valleys of southern California, southern Arizona, extreme southern Nevada, and southern Texas. (Fig. 37.)

It soon became evident that very few of the many choice Old World varieties were adapted to culture in this country, and the promising ones needed prolonged and very careful study before they were sufficiently understood to justify being grown on a commercial scale.

About 10 years after the first offshoots had been planted a few varie-

About 10 years after the first offshoots had been planted a few varieties began to show decided promise of succeeding here. The Deglet Noor was one of these, but good fruit of this variety was not produced in commercial quantities until the twelfth year after the offshoots had

been planted. New methods of curing Deglet Noor dates were developed by the date specialists of the Arizona Agricultural Experiment Station and the United States Department of Agriculture, and these enabled American date growers to produce fruit that equaled or even surpassed that grown in the Old World. Thereupon a farmers' cooperative date association was formed, with the assistance of the Department of Agriculture, to import offshoots of this and other varieties, and interest in commercial date culture grew very rapidly. Stimulated by the active interest in date culture, a private nursery company made large importations of date offshoots from Mesopotamia, Arabia, and several other date-growing countries in the Old World from 1912 to 1914.



Fig. R. 47 — Fourteen-year-old Deglet Noor date pulms in full fruit in a private gaiden near Indio, Calif, October, 1930 Adjustable picking platforms are attached to the palms, and on most of the bunches the fruit is protected by burlap coverings

# Only a Few Varieties Commercially Established

Little by little one date variety after another was studied thoroughly enough so that its culture could be undertaken with reasonable assurance of success. In this pioneer work the contributions made by experts in charge of private date-packing houses were of decisive importance. In spite of many years of study, not over a dozen varieties out of more than 100 that have been introduced from the Old World are known well enough to be safe for planting on anything more than a dooryard scale. Only half a dozen are grown on an acreage basis, chiefly Deglet Noor, Halawy, Khadrawy, Zaheedy, Hayany, and Saidy. A few other varieties that enjoy a high reputation in the Old World, such as the Barhee, Khalasa, Maktoom, and Dairee, are planted on a small commercial scale. Still others, famous in the Old World,

that have made a good showing here are still so scarce that it will be many years before even small commercial plantings can be made of

them. (Fig. 38.)

As a result of the cooperation of alert and intelligent American date growers, expert date packers, and scientific experts, such rapid progress has been made in the culture of the date palm and in the handling of its fruit that it can be safely asserted that more has been done to improve date culture in this country in the last 25 years than has been accomplished by the Old World date growers in the last 25 centuries.



FIGURE 35 —1 oung Deglet Noor date palms growing near Indio, Calif, October, 1930. The palm in the foreground carries about 15 bunches of fruit protected with burlap coverings. (Photograph by Avery Edwin Field)

## A Noncompetitive Crop

The date industry in the United States is an excellent example of a new and noncompetitive crop and as such merits attention when many crops are grown in quantities so large as to be difficult to market. Every acre of irrigated land in the Southwest planted to dates is taken out of competition with the orchard and field crops of this country for a long period, probably permanently. The United States imports from 50,000,000 to 80,000,000 pounds of dates annually, and in spite of the rapid growth of date culture in the hot irrigated valleys of southeastern California and southwestern Arizona, the domestic production of dates is only between 2,000,000 and 3,000,000 pounds. Continued healthy growth of date culture is almost certain to lead to the production within the next decade of an appreciable tonnage of choice, well-cured, home-grown dates. These will be so attractive in appearance that they will readily gain a place at the banquet table and so clean and of so delicious a quality as to hold the favor of all who taste them.

WALTER T. SWINGLE, Bureau of Plant Industry.

ATE Ripening Controlled Beneficially by Using Special Kinds of Pollen The time of ripening of all fruits has been believed to be entirely a matter of variety as affected by environmental relations of climate,

soil, and culture. It is now known that in the case of the date palm there is, within certain limits, a direct effect of pollen on the time of ripening of the fruit.

Conclusive proof of this new and unexpected influence of the pollen parent on the fruit tissues belonging to the mother plant was obtained

in 1925. This effect has been called metaxenia.

The experiments have since been continued in commercial date gardens in the Coachella Valley in California and in the Salt River and Gila Valleys in Arizona, always with the same results. The effects of the pollen of more than 100 different male date palms have been studied in this way. Most of these male palms produced pollen causing the fruit to ripen in midseason. A few males caused very early ripening of the crop and a very few late ripening.

In most plants such an influence would have only scientific interest and value, but in date culture artificial pollination is commonly practiced, owing to the fact that the pollen is produced on a different plant from the one that produces the fruit. Very early in the evolution of date culture there developed the practice of maintaining only a few male palms, the pollen of which suffices for a large number of females.

Pollen from a male date palm known to cause early ripening was applied in 1930 to one group of Deglet Noor palms and that causing late ripening to another comparable group, and a record was kept of the fruit as picked from each. At the United States Experiment Date Garden at Indio, Calif, the difference in time of ripening was 15 days at the beginning of the season, increasing to 20 days when 98 per cent of the crop was ripe. At the Indian Wells district, a few miles away, where the normal ripening is somewhat later, there was a difference in time of ripening of 21 days at the beginning of the season, increasing to 37 days when 98 per cent of the crop was ripe.

# Practical Value of the Discovery

As would be expected from this record, it has proved possible to utilize pollen causing early ripening to insure the ripening of late varieties in regions having too short or too cool a summer to permit the dates to mature properly. On the other hand, pollen causing late ripening is used to delay ripening of dates in regions having an excess of summer heat when the crop tends to ripen too early, as in the hotter parts of the Coachella Valley in California, now the chief date-producing region in the United States.

Date palms in the Southwestern States produce from 8 to 20 flower clusters over a period of 8 to 10 weeks in early spring, and the ripening period of the fruit bunch extends about 6 to 10 weeks, depending on the variety and on the temperature prevailing during the ripening

season.

A new application of the effects of pollen in controlling the time of ripening of dates was tested in 1930. Pollen from two different male palms known to evert very diverse effects on the time of ripening of the fruit was used on a single bearing date palm. This differential pollination, as it may be called, was carried out by applying pollen known to cause late ripening to the first flower clusters to open in spring, and

pollen known to cause early ripening to the later blooms. The effect of this method of pollinating was to shorten decidedly the ripening season of the dates. When the two kinds of pollen were applied in reverse order, viz, early-ripening pollen to the first blooms and lateripening pollen to the late blooms, the reverse effect was secured and the ripening season was decidedly lengthened.

### Late Ripening Beneficial in Some Areas

The fruit of the Deglet Noor variety, the chief commercial date in this area, which matures during the extreme heat that prevails during the latter part of August and the first three weeks in September, is distinctly inferior in keeping quality and in flavor to fruit maturing in October and November, when the weather is much cooler and ripening less rapid. In most parts of the Coachella Valley a considerable proportion of the crop is harvested by the last of September, and under such conditions the exclusive use of pollen that causes late ripening is beneficial. However, in the Indian Wells district, the custom of using pollen that causes late ripening delays the beginning of the harvest until about the first of October, but the exclusive use of such pollen here throws the ripening of the latter part of the crop into December and January, and even into February. Prolongation of the ripening season into winter greatly increases danger from rain, as most of the precipitation occurs at that season; and because of the slowness with which fruit ripens in cold weather such prolongation results in a decided slowing up of the harvest with consequent greater expense in handling the fruit. The use of differential pollination to shorten the ripening period thus becomes of particular practical significance in date culture in this district, eliminating undesirable early fruit on the one hand and speeding up the ripening of the later fruit on the other hand, so as to reduce substantially the loss from late rains and a prolonged harvest.

The reverse form of differential pollination, which lengthens the ripening season by the use of pollen known to cause early ripening on the early blooms and late-ripening pollen on the late blooms, promises to prove advantageous in regions where sudden autumnal rains injure

or destroy all dates in the final stages of ripening.

In marked contrast to most technical improvements in agriculture, differential pollination entails no extra cost to the grower. All that needs to be done in order to reap the advantages that have already been demonstrated is to change from one kind of pollen to another when about half of the flower clusters have opened.

Roy W. Nixon, Bureau of Plant Industry.

OGS and Cats May Be Kept Off Flower Beds by Nicotine Sulphate Dogs and cats sometimes become obnoxious about certain premises by running over flower beds, ruining shrubbery, and invading areas where they

are not wanted. It is not always possible to drive away the intruders before damage has been done, and fencing is often undesirable. Many persons appeal every year to the department for some harmless means of repelling the animals without injuring either them or the shrubbery and flower beds.

The Bureau of Animal Industry has been suggesting the use of a nicotine sulphate spray to solve this problem, and the reports received from those who have used it indicate that it is very effective. Dogs and cats find the odor of nicotine very repulsive, and since their sense of smell is very much keener than that of man it is possible to use the compound in such high dilution that it is inoffensive to any person.

Nicotine sulphate is widely used as an insecticide and when it is properly diluted and applied, it is beneficial to plants and not injurious to buildings, walls, or walks. It may be obtained at seed and fertilizer stores in packages labeled with directions for diluting and applying. If the premises are sprayed with the dilute solution, dogs and cats will avoid the neighborhood of the sprayed areas. The odor will repel them.

The spray evaporates in time and will be washed off by rain; consequently, it should be renewed about once in two weeks and after heavy or long rains. Livestock should not be permitted to graze on vegetation that has been sprayed with nicotine sulphate.

JAMES F. COUCH, Bureau of Animal Industry.

PROUGHT Losses of 1930 and 1931 Indicated by Crop and Income Data

Crop production in 1931 was adversely affected by drought in the spring-wheat States of North Dakota, South Dakota, and Montana

and in adjacent areas in Minnesota, Nebraska, and Wyoming. In South Dakota a severe grasshopper infestation due to the unusually mild winter of 1930–31 combined with the drought to reduce crop production to the lowest level in years. Distress among the farming population of these States and among those who depend upon the farm trade for their livelihood was most severe in Montana, northern Wyoming, and western North Dakota, where drought had also occurred in 1930. The great drought area of 1930 in the Potomac, Ohio, and lower Mississippi River Basins produced larger than average crops in 1931.

Figure 39 indicates the extent of the 1930 drought. The most severely afflicted area extended from southern Pennsylvania, Maryland, and Virginia to southern Kansas on the north, Alabama on the south, and Texas on the west. In a separate area comprising a large part of Montana and portions of North Dakota and Wyoming, pro-

duction in 1930 was also severely limited by drought.

The figure indicates relative conditions on about August 20, when the drought was near its peak. In some parts of the area relief came in time to improve somewhat the final outturn. In other areas the drought continued unabated until late autumn. The relative severity of the drought in 1930 is indicated by the composite yields per acre of crops expressed as a percentage of the 1919–1928 average yields. In order, these percentages are as follows: Kentucky, 60.5 per cent; Arkansas, 62.8; Missouri, 66.8; Virginia, 67.7; Oklahoma, 71.2; Montana, 70.4; Maryland, 73.4; Tennessee, 75.6; Ohio, 79.3; Illinois, 83.1; Indiana, 84.7; Texas, 86; Pennsylvania, 87.6; Mississippi, 91.5; Louisiana, 100.3; and Alabama, 111.3.

The figures quoted are averages by States and consequently do not reflect the full severity of the drought in the areas affected. Portions of such States as Ohio, Indiana, Illinois, Texas, Louisiana, and Ala-

bama were not in the extreme-drought area. Furthermore, the cotton crop in Louisiana and Alabama withstood the drought in a surprising manner. Consequently, in those States the composite yields for each State as a whole do not reflect the reduction in crop production in the portions adversely affected by the drought.

### Damage to Various Feed Crops

The loss in crop production due to drought in 1930 was most serious for corn, sorghums, and hay and was less serious for the other feed crops—oats and barley. Winter wheat, rye, and many of the vegetable crops were largely harvested before the drought became severe. The main spring-wheat area of Minnesota and the Dakotas and the principal potato-producing sections were outside the drought area. Corn production in the United States fell to 77.1 per cent of the 1925—

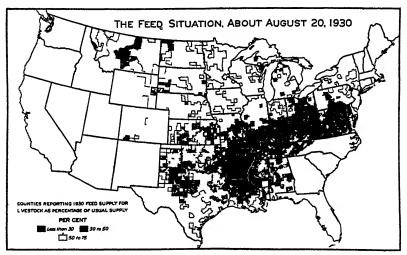


FIGURE 39—Drought of 1930 affected crop production in many States and was particularly severe in an area from southern Pennsylvania, Maryland, and Virginia on the east to central Kansas on the north, central Texas on the west, and western Alabama on the south. An area in central Montana and western North Dakota also suffered

1929 average and hay to 88.5 per cent; oats production in the United States was 2.2 per cent above average; and barley, as a result of rapid expansion of acreage, was 35.4 per cent above. There was, however, a serious shortage of these crops in the drought area. Wheat production was 2.1 per cent above average; rye, 1.2 per cent below; cotton, 6.3 per cent below; potatoes, 8 per cent below; and tobacco, 16 per cent above.

Pastures for livestock were scant for many weeks. For the entire 1930 pasture season, pastures in the drought States were from 50 to 80 per cent of the 10-year average. Poor pastures during the summer months and short supplies of grain and hay greatly affected the production of animal products in the latter half of 1930. Thus, on August 1 milk production per cow in those States averaged 11.3 per cent below production on the same date in the previous year and egg production per hen averaged 9.5 per cent lower. In spite of somewhat curtailed production during the drought months, however, the production of

milk and eggs, both in total per cow and total per hen, for the full year 1930 was quite generally above or very close to the average of the

5-year period 1925-1929.

A mild autumn and winter greatly reduced the requirements for feed for livestock and the meat supply of 1930 appears not to have been seriously affected. Production of beef was 3 per cent above average; of calves (veal) 1 per cent below; and sheep and lambs 10 per cent above. Production of hogs was 6 per cent below the 1925–1929 production. This decrease was not entirely due to the drought but rather to declining hog numbers on hand when the drought began.

The decreased production of farm products in 1930 is reflected in the reduced farm income in the drought-stricken States. Although a considerable percentage of the reduced income in 1930 was due to the lower prices that accompanied the world-wide business depression, a

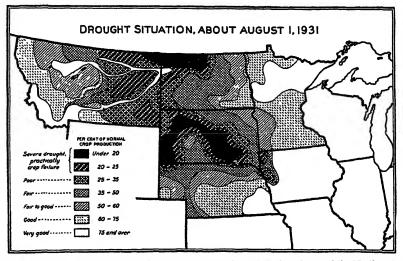


FIGURE 40.—Drought of 1931 was largely confined to the spring-wheat States of the Northwest, with contiguous areas in Idaho, Nebraska, and Wyoming. Parts of Montana, North Dakota, and Wyoming suffered in both 1930 and 1931

material part of the reduction in the drought area was brought about by decreased quantities of agricultural products available for sale or family consumption. Gross income in this group of States varied from 54 per cent of the 5-year average in Arkansas and Oklahoma to 85 per cent in Indiana, whereas gross income for the United States as a whole was 84 per cent of average.

#### 1931 Drought Less Extensive

The drought of 1931 was more limited in area. Figure 40 shows its extent and effect upon crop conditions on August 1. Crop deterioration continued unabated until the coming of winter. The composite yields of crops in North Dakota were 55 per cent of the 10-year average yield; in South Dakota, 43 per cent; and in Montana, 54 per cent. In addition, about 18 per cent of the planted crop area was an entire failure in South Dakota, 22 per cent in North Dakota and 35 per cent in Montana. Production of practically every crop grown in those States

was less than half of average. Because of their importance in the production of spring wheat and flaxseed, the production of these crops in the United States was the lowest in many years. The spring-wheat crop was 40 per cent of the 1925–1929 average; the flaxseed crop, 54 per cent. The scarcity of both food and feed crops in those States necessitated a very considerable out-movement of livestock, particularly sheep and beef cattle, from the ravaged sections. The composite condition of pasture during the entire 1931 pasture season in South Dakota was 55.9 per cent of the 1921–1930 average; in North Dakota, 61.3 per cent; and in Montana, 53 per cent. Production of milk per cow during the pasture season was low, but for the entire year in North Dakota was 106.3 per cent of the 1925–1929 average; in South Dakota, 109.2 per cent; and in Montana, 100.8 per cent. Egg production for the year was 103.9, 107.2, and 106 per cent, respectively, of the 1925–1929 average in those States. High production in the early and late months of the year more than offset the low production of the summer months.

With greatly reduced quantities of crops available for sale and prices that were even lower than the low prices of 1930, the income of farmers in the 1931 drought area was seriously curtailed. It seemed likely that income in those States would be less than 30 per cent of the 1925—

1929 average.

JOSEPH A. BECKER, Bureau of Agricultural Economics.

Parming Calls for Native Pastures as an Important Adjunct

The history of dry-land farming is closely associated with that of the live-stock industry, especially in the Great Plains area. With the introduction of

dry-farming tillage methods, much of the native range was broken up, and its value as range land was destroyed. Some of the land that was broken up might better have been left in native sod and utilized as native pasture. A great deal of good native range was converted into

poor dry farms.

Native pastures are an important adjunct of the dry farmer, for without them many dry farms would be of little value. The value and importance of native pastures in dry-land farming are not given due consideration in the farming scheme. The native pasture is usually the hardest-used piece of land on the farm. Within recent years native pastures are becoming better understood as an integral part of the dry-land farm.

Since 1915 the United States Department of Agriculture in cooperation with the North Dakota Agricultural Experiment Station has been investigating near Mandan, N. Dak., the problems connected with the

utilization of native pastures on the dry-land farm.

The native vegetation in this area forms a comparatively dense sod and covers from 60 to 65 per cent of the ground. A large percentage of the feed for grazing animals is furnished by blue grama grass, western needle grass, and prairie June grass.

The cattle used in the grazing experiment are 2-year-old grade steers of the standard beef breeds. The period of grazing is five months, or

from May 15 to October 15.

The first problem was to determine with some degree of accuracy the grazing capacity of the native range as it existed in this section. The

next step was to work out methods of pasture management that would afford the native vegetation an opportunity to produce its maximum

amount of forage.

Pastures of 100, 70, 50, and 30 acres are grazed with 10 steers each. The 100-acre and the 70-acre pastures furnish enough feed to allow the cattle to make maximum gains for the five months. The steers in these pastures gain on the average approximately 300 pounds per head. About one-third of the total gain is made in June, with decreasing amounts each month to the end of the season. The pasture that is grazed at the rate of one steer to 10 acres is larger than necessary, but that grazed at the rate of one steer to 7 acres furnishes the right amount of forage for a system of continuous grazing on the ordinary dry farm in that section of the Plains.

## Five Acres to One Steer Not Enough

The 50-acre and the 30-acre pastures do not furnish enough feed to allow the cattle to put on the gains of which they are capable. The steers grazed at the rate of one steer to 5 acres gain about 240 pounds in the 145 days during which their pasture will support them. The steers grazed at the rate of one steer to 3 acres gain 170 pounds in the 114 days during which the pasture will carry them. Both pastures are overstocked, as indicated by the low gains of the steers and by an increase in undesirable plants in the pastures.

Native pastures are too often grazed like the 30-acre pasture. The remedy for such overgrazing is more native pasture, a different system of grazing, less stock, or cultivated pastures to supply early-sea-

son grazing.

A 70-acre pasture divided into three parts and grazed by a deferred and rotation system carries one steer to 5 acres through the season without injury to the native vegetation and allows an average gain of

270 pounds.

Cultivated pastures of bromegrass, crested wheatgrass, or sweetclover have a high carrying capacity in the early season and can be used to advantage to supplement the native pasture. They should be grazed early in the season and the native pasture later in the season.

The dry-land native pasture too often is not given an opportunity to produce its maximum quantity of feed because of too heavy grazing which gradually weakens the vegetation and causes a marked decrease in yield.

J. T. Sarvis, Bureau of Plant Industry.

PY Farming in Extensive Operations Mainly Uses Crops of Low Acre Value

Crops may be adapted to or find their place in dry farming for different reasons—some because they are drought resistant or drought

evasive, some because of comparative freedom from disease or insect pests, and others because of economies of production. Production on dry land is limited by the quantity of water that is available. Dryland crops in general, therefore, are those of comparatively low acre values that lend themselves to efficiency and economy of production.

Wheat is perhaps the widest and most generally grown dry-land crop. It is fairly drought resistant and economic in its use of water, and its early maturity enables it to make the fullest use of water stored in the soil before it is seeded. Since wheat has both winter and spring varieties, few if any other crops are adapted to a wider range of conditions or are relatively more productive. Dry-land wheat is of the

highest milling and baking quality.

Oats and barley are standard dry-land feed crops in the northern and central Plains, but south of central Kansas they are grown only when early spring rains occur and other seasonal conditions seem favorable. In some localities barley is the most productive grain that can be grown.

Rye occupies a smaller acreage but is an important crop in North Dakota, Montana, South Dakota, and Nebraska. Both winter and spring varieties are grown. Winter rye is hardier than winter wheat and finds a place where conditions are too severe for the latter crop

to survive.

Except for the flaxseed grown in a few counties in southeastern Kansas, practically all that of the United States is grown in the north-

ern Plains and adjacent prairies.

Beans are an important dry-land crop in Colorado and New Mexico, and their production is rapidly increasing in other States except where the frost-free season is very short. Cheapness of production as a result of freedom from disease is a strong factor in giving beans a place among the dry-land crops. They are also a good rotation crop with wheat.

Sorghums Are Drought Resistant

Sorghums of various kinds constitute the feed crops and some cash crops from central Kansas southward. The sorghums are drought resistant and very efficient in their use of water. They are of five general classes: (1) Milos and feteritas, dry stemmed and grown for the grain; (2) kafirs, juicy stemmed and yielding grain and forage; (3) sorgos, or sweet sorghums, with sweet, juicy, leafy stems, used for hay, forage, and silage; (4) Sudan grass, grasslike and leafy, giving hay and pasture; and (5) broomcorn, from which the brush is used for the manufacture of brooms. The stover is sometimes utilized for feed. Sorgo and Sudan grass range much farther north than the other sorghums, and they are of some importance up to the northern boundary of the United States or beyond.

Corn is a widely distributed dry-land crop, but except in a few sections is a distinctly minor one. In the primitive culture of the Indians it was and is a staple crop even under conditions of extreme aridity. As a dry-land field crop it is reasonably certain to produce a fair-to-good tonnage of feed but may fail to set ears. It is of most importance in the central and northern Plains, where it is used as a

rotation crop with wheat and other small grains.

Cotton has become firmly established as a dry-land crop well adapted to the Plains region of Oklahoma, Texas, and New Mexico. Making its growth late in the season, it is able to make efficient use of the rainfall. Abundance of sunshine brings an early and uniform ripening, and in this region it is free from many of the insect and disease enemies occurring in more humid regions.

Cowpeas in southern sections and field peas in northern sections are annual legumes grown for feed. Soybeans and peanuts are less ex-

tensively grown.

Millets and prosos have a small but important place, chiefly as catch crops for hay and seed.

Cultivated perennial hay crops are of low general adaptation to dry farming, but in the Northern States with spring rainfall alfalfa, bromegrass, crested wheatgrass, and slender wheatgrass are reasonably sure and productive, but do not lend themselves to short or medium-length rotations. Biennial sweetclover is of much wider adaptation and promise as a rotation crop.

With proper care and the selection of favored sites, adapted trees, fruits, and most common garden vegetables can be raised for the protection and ornamentation of the dry-land home and for home

consumption.

E. F. CHILCOTT, Bureau of Plant Industry.

Parming in Pacific Northwest is Based on Grain and Clean Fallow

The dry-farm areas of the Pacific Northwest include most of the tillable land east of the Cascade Mountains in Oregon, Washington, and

northern Idaho. The topography, elevation, soil, and climatic conditions differ widely in this area. The typical dry-farmed soils are mostly sandy or silt loams and are located in sections where the average annual precipitation ranges from 8 to 18 inches.

As in other dry-farmed sections, the annual precipitation and its distribution throughout the year are the most important limiting factors in crop production. In some areas the availability in the soil of sufficient nitrate nitrogen for the plants also is of much importance.

Unlike the dry-farmed area of the Great Plains, where most of the precipitation occurs during the spring and summer months, most of the precipitation in the Pacific Northwest occurs during the late autumn, winter, and spring months. This difference in the distribution of the precipitation not only influences the crops that can be grown profitably, but also makes changes in tillage practices necessary.

Because of lack of rainfall during the growing season, late-maturing crops such as corn are not so well suited to the Pacific Northwest as are the cereals and other crops that ripen early enough to escape the hot, dry summer weather. Winter wheat is the most widely grown and most profitable crop, spring wheat ranking second, and barley third. The most popular winter-wheat varieties are Turkey and Hybrid 128. For spring sowing Baart and Federation are the leading varieties. The most promising legumes are those that mature early. In the higher-rainfall sections field peas are commercially grown in a rotation with wheat.

Farm practice usually is the outgrowth of necessity. Successful crop production on the dry lands of the Pacific Northwest is based on alternate crops of grain and clean fallow. The experience of farmers and the results of investigations on several experiment stations in this area justify the conclusion that the alternate raising of grain and fallowing is the safest and most profitable method of crop production where the precipitation is less than 15 inches. Where the precipitation is higher, crop rotation is practicable.

#### The Controllable Factors

Of the controllable factors that influence yields, the preparation of the fallow has been found to be one of the most important. To maintain a good fallow the following points are essential: (1) The land should be left with stubble standing during the winter. This aids in holding the snow and in moisture absorption. Fall disking or fall plowing is not advisable. The stubble should not be burned, but should be plowed under, thus adding some organic matter to the soil and helping to prevent erosion.

(2) Land should be plowed early in the spring or when there is enough moisture to plow easily and well. If plowed late in the spring, land should be disked early enough and thoroughly enough to prevent

all plant growth.

(3) After plowing, cultivation enough to keep the land free from weeds is all that is needed. The best implements for this purpose have been found to be spike-tooth harrows, spring-tooth harrows, and blade or rod weeders.

The combined harvester, a machine that has been in general use in the Pacific Northwest for more than a quarter of a century, has practically replaced all other machines for harvesting cereals. Its use in harvesting is particularly well suited to this region and is the most economical and efficient method yet devised. The use of tractors, for both tillage and harvesting operations, has greatly increased during the last 10 years, those of the caterpillar type being most popular because of being better suited for working on hilly or rolling land.

D. E. Stephens, Bureau of Plant Industry.

Paractices
Determined by Climatic
and Soil Conditions

The term "dry farming" was first used in the irrigated districts of the West to designate farming without irrigation in a section where irriga-

tion was generally practiced. The term was used later in some semiarid sections to distinguish the activities of the man who cultivated the soil and sowed crops from the activities of the rancher whose livestock pastured on the native sod. The use of the term has been extended to sections that have no irrigation, and it has come to mean specifically the production of crops without irrigation in regions of deficient rainfall. But as the rational development of this activity has in many sections compelled the keeping of livestock to consume all or a portion of the crops produced, the use of the term has broadened until it has come to mean farming without irrigation under dry conditions. Aside from the exclusion of irrigation, it does not apply to a method of farming, but is descriptive of the conditions under which it is done. In the United States its use is generally limited to sections having an average annual precipitation of less than 20 inches and in the northern tier of States, where temperatures and evaporation are low and the season short, of less than about 16 inches.

Dry-farming conditions in the United States are found in the Great Plains, lying between the ninety-eighth meridian and the Rocky Mountains, and in the intermountain valleys and plateaus to the westward. The largest dry-farming areas in the intermountain region are located in the Great Basin, the Columbia River Basin, and the Snake River Basin.

The factor that distinguishes dry farming from farming in more humid regions is the limited water supply. Differences in the quantities of water available are responsible for certain fundamental differences in the practices of the two regions or types of farming.

### Effects in Humid Regions

In humid regions more water enters the soil than the vegetation that occupies it can remove. The excess water moves downward through the soil, leaching with it soluble salts and reducing fertility. As its downward passage is checked or retarded by more or less impervious soil or strata it accumulates to the point of saturation and is known as ground water, the upper surface of the ground water being known as the water table. Since there is an excess of water, there is no incentive to accumulate or conserve it. The aim is rather to have the ground occupied by a growing crop for as much of the year as possible. This affords a surface cover to prevent washing, and either furnishes economic return in the form of a harvested crop or checks the loss of fertility by taking it up in plants and returning it to the soil in green manure.

In arid and semiarid regions the amount of water that reaches and enters the soil is no more than sufficient for the current needs of the vegetation that occupies it. Seldom or never, depending upon the rainfall and soil of the area in question, does water penetrate beyond the zone occupied by plant roots. There is no downward passage of water beyond this zone, no leaching of the soil, and no accumulation of ground water or formation of a water table. The absence of a water table or the presence of a permanently dry subsoil may be properly considered as the feature that determines or distinguishes dry farming and makes its practices necessary. Water being the vital substance that is deficient or at least not present in excess quantity, its conservation and economic utilization become of primary importance in dry-farming agricultural practice.

The endeavor of the dry farmer, in contrast to that of the humid farmer, is to keep the land free of vegetation for as much of the season as is consistent with the production of crops. In its extreme form this may result in deferring cropping and maintaining a bare fallow for an entire year or longer. The object is to accumulate in the soil during this period of greater or less length a store of water to supplement as far as possible the insufficient amount that may be expected to fall

while the crop is growing.

JOHN S. COLE, Bureau of Plant Industry.

UTCH Elm-Disease Survey Indicates This Disease Not Widespread in This Country

During the summer of 1930 the attention of the Department of Agriculture was called to wilting elm trees at Cleveland, Ohio.

Careful laboratory cultures made by Curtis May at the Ohio Agricultural Experiment Station indicated the presence of the fungus Graphium ulmi, which in northern Europe is the cause of a serious disease of elms known as the Dutch elm disease. This determination was verified by Dr. Christine Buisman, a visiting Dutch plant pathologist, who was familiar with the diagnosis of the disease.

In cooperation with the Ohio Agricultural Experiment Station, the department instituted an immediate search for other trees affected with this disease. As a result of this search, up to October 15, 1931, seven trees affected with *Graphium ulmi* had been found in Cleveland and one in Cincinnati, Ohio. No authentic cases had been found else-

where in the United States.

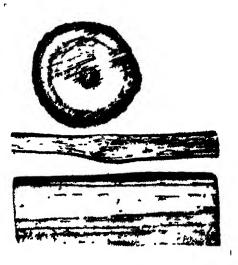
The presence of the Dutch elm disease is indicated by the sudden wilting of the leaves of a part of the crown of the tree, of the entire tree, or of the tips of some of the side branches. Drying and discoloration of the leaves and defoliation may follow. If a clean cut is made across an affected twig, a brownish discoloration is evident in the sapwood. This discoloration, as it appears in cross and longitudinal sections of infected elm twigs, is shown in Figure 41. The smaller of the two elms shown in Figure 42 was wilting and dying in July, 1931, when the trees were discovered. The larger tree had died suddenly in the summer of 1930, but it was not found until 1931. Discoloration of the Graphium ulmi type was evident in the 1930

and 1931 rings of wood of the smaller tree and in the 1929 and 1930 rings of the larger tree.

### Field Diagnosis Impossible

Unfortunately, field diagnosis of this disease is impossible.

In addition to Graphium ulmi, at least two fungi, and probably several, and possibly some bacteria, produce the same visible external and internal symptoms. Therefore, a cooperative Dutch elm disease laboratory has been established at the Ohio Agricultural Experiment Station to select from wilting elms discovered those whose trouble is really caused by this foreign parasite. There the parasites causing disease of this type are isolated FIGURE 41.—Cross and longitudinal sections of branches of elm showing discolored woody tissue from the specimens taken by



State and Federal scouts or received from interested volunteer observers and are grown in cultures until the nature of the parasite is determined. In the two summer seasons of 1930 and 1931, up to October 15, 1931, cultures had been grown from about 850 trees showing suspicious symptoms, and of this considerable number of specimens examined, G.ulmi was present in eight only.

Since so few trees affected by the disease have been found in this country, it was manifestly unsafe to permit these trees to remain undestroyed and to conduct here experiments to determine the mode of transmission of the disease from tree to tree. Our knowledge of the movement of the disease is, therefore, based on observations made in Europe and reports received from there. Such study of this problem as has been made there indicates that the spores of the fungus are produced in cavities made by wood borers in the killed elm wood and on the exposed surfaces of dead wood. The wood borers themselves seem to be the active carriers from tree to tree. But carriage by such insects alone can not account for movement over long distances in Europe or for movement across the Atlantic Ocean barrier from Europe to  $\Lambda$ merica. In Europe the area covered by the disease has gradually expanded since its first discovery in the Netherlands in 1919, till it now extends from Norway on the north through Germany, the Netherlands, England, Belgium, and France to Italy. The movement of diseased nursery stock could effect the transfer from Europe to America, but since the establishment of Quarantine 37 on June 1, 1919, there has been almost no movement of elm nursery stock from Europe to the United States and not a single recorded case of its movement from Europe to Ohio. Under special permit for propagation, one shipment of keyaki (Zelkowa serrata), a related and susceptible Japanese and Chinese tree, was made to the State of Ohio from England, but this occurred before the disease had appeared in Great Britain and the stock did not go to the localities where the Dutch elm disease has been found. None of

FIGURE 42 —Two elm trees discovered in Cleveland, Ohio, in 1931. The larger had died in 1930, the smaller was dying when

the diseased elms found in America has been traced to any nursery.

Since the fungus withstands drying, it is possible that it was brought to America on box lumber made from affected elm trees or on infected elm leaves accidentally included in goods shipped from an affected region. But there is as yet no evidence to verify such

suggestions.

Various inoculation experiments and European experience indicate that the Dutch elm disease may attack the American elm (*Ulmus* americana), the English elm (*U. campestris*), the Holland elm (*U. hollan*dica), the Scotch elm (U. glabra), and the nearly related keyaki (Zelkowa serrata). Thus far inoculations made on the Chinese elm (U.pumila) have not produced the disease. In

America there are several other species of elms whose susceptibility to this disease is being investigated.

# Greater Part of Ohio Surveyed

During the growing seasons of 1930 and 1931 the greater part of Ohio was surveyed for this disease, especial attention being given to the immediate vicinities of the discovered infected trees at Cleveland and Cincinnati. Scouts were sent into the field by both the Federal Government and the Ohio State Department of Agriculture. Scouting trips were also made into Indiana, Illinois, Missouri, Kentucky, and West Virginia. Scouts and forest pathologists engaged in other parts of the country also searched for the disease. Descriptions of the trouble

were sent to interested persons in all parts of the country, and a gratifying response came from plant pathologists, foresters, tree surgeons, park commissioners, and lovers of trees in general.

While the outlook is bright and we may even hope that this disease, so serious in Europe, is in the United States purely local and confined to two points, yet it is not time to relax our vigilance. Elms are almost everywhere in the United States. Cooperative search for the disease alone can cover them. During the next growing season those interested in elms either as shade and ornamental or as forest trees are urged to watch them carefully for wilting accompanied by browning of the recent wood rings. Whenever such a case is discovered, the infected twigs should be cut, well wrapped, and mailed for diagnosis to the Dutch elm disease laboratory, Ohio Agricultural Experiment Station, Wooster, Ohio.

R. Kent Beattie, Bureau of Plant Industry.

GG Hatching Prevented by Certain Bone Defects → of the Developing Embryo

One of the greatest sources of loss to the poultry industry is the failure of fully one-third of all the eggs incubated in the United States

annually to hatch. Among the causes for this high proportion is the development in the growing embryo of certain bone defects which make hatching impossible. These defects may arise from faulty conditions of storage or incubation of the egg, from faulty nutrition of the hen that laid the egg, or from inheritance.

# Defects Caused by Faulty Storage or Incubation

The two sides of the upper beaks of some embryos grow unequally because of the absence or lack of development of one of the eyes. The beaks of such embryos become crossed so that they are unable to pip. The upper beaks of other embryos are entirely lacking or are very small because of rupture of the brain during the first days of incubation. Defects such as these are sometimes caused by too high temperature—over 70° F.—of the room in which the eggs were stored before incubation. Other possible causes are an unduly low temperature immediately after laying, or too high or too low incubation temperatures.

# Bone Defects of Nutritional Origin

Lack of sufficient vitamin D in the diet or lack of direct sunlight for breeding hens causes the bones of embryos developing in eggs produced under such conditions to be so soft as to prevent hatching.

Lack of sufficient, good-quality protein in the diet of breeding hens probably causes the condition called chondrodystrophy in the embryos developing in the eggs of some hens under such conditions. Embryos so affected have hard bones but the leg bones are bent sharply and the beaks are parrotlike. Such embryos do not hatch. A mixed animalprotein supplement, such as a combination of meat meal, fish meal, and dried milk, in the diet of the breeding hens, will prevent the condition.

Bone Defects of Hereditary Origin

Fowls of the "creeper" type, so called because of short or defective legs, carry an hereditary character that prevents the hatching of onefourth of the fertile eggs from matings among creepers. Adult creepers have very short legs but the embryos that are unable to hatch because of the inherited trait have almost no legs and die early in the incubation period. As far as is known, all creepers have this hereditary defect.

Another condition, called "stickiness" (fig. 43), prevents the hatching of about one-fourth the embryos in eggs from breeding stock in

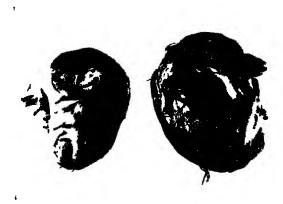


FIGURE 43 —Left, a full-term "sticky" embryo, right, a normal embryo of the same age and ancestry

which this hereditary characteristic occurs. Fowls which transmit stickiness are perfectly normal in appearance. Sticky embryos fail to absorb the liquid in which every embryo is immersed until the eighteenth day of incubation. and consequently are sticky at hatching time. These embryos have very soft bones. Embryos not affected by hereditary stickiness sometimes fail to absorb this liquid, but such embryos have bones of normal hardness. An

abundance of vitamin D added to the diet of the breeding stock does not prevent hereditary stickiness. This objectionable quality, however, may be eliminated from flocks in which it is present by selecting for breeding only the offspring of fowls which produce no such embryos.

THEODORE C. BYERLY, Bureau of Animal Industry.

GG Size and Numbers Can Be Increased by Methodical Breeding

The need for a high average production of eggs to insure profitable returns from poultry flocks is generally recognized. Information from the Massachu-

setts, Ohio, California, and New York experiment stations, as well as from the United States Animal Husbandry Experiment Farm, Beltsville, Md., shows that income over feed costs rises as production increases. This information shows, likewise, that profits in poultry keeping are directly related to average egg production per bird. Since increased egg production for the flock is the most practical way of insuring profit, the fundamental importance of improving egg-laying ability can readily be seen. The poultry industry sustains a serious annual economic loss because large numbers of pullets fail to reach a profitable level of production and must be culled. On commercial poultry farms only about 50 per cent of the pullets are considered to be valuable enough to be retained for a second year.

The use of high-producing hens in flock matings tends to result in offspring of satisfactory laying ability, but consistent advancement seldom occurs unless a system of progeny testing is used which enables the poultry breeder to recognize breeding worth in individuals and

families. By persistence in testing the offspring of individual matings, he can develop a group of proved sires and dams to serve as a source of cockerels for improving future production. The trap nesting and pedigreeing entailed in methodical work of this kind help to disclose ability

to transmit not only egg production but also egg size and hatchability and the constitutional vigor of individuals and families. Since these characteristics are hereditary, the selection of the more desirable birds can be carried on with increased efficiency. Good results will almost invariably be attained if careful records are kept and applied. Figure 44 shows a high-producing Rhode Island Red family developed at the United States Animal Husbandry Experiment Farm through progeny test-

### Body Conformation Not a Reliable Guide

The progeny test would be unnecessary and progress in breeding would beless difficult, if it were possible to select vigorous, high-producing stock by such external characters as body shape or head points. Several investigations have shown that livebird measurements are of relatively little value in classifying birds on the basis of

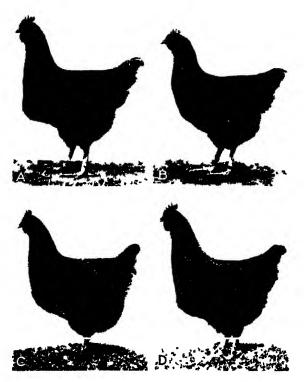




Fig. 1. 12 44 — High-producing Rhode Island Red family developed it the United States Animal Husbandry Experiment Farm, Beltsville, Md, through progeny testing A, Foundation hen, No. 10011, produced 157 eggs in one year, B, hen No. 1795, daughter of hen No. 10011, produced 236 eggs; C, hen No. 5816, daughter of hen No. 1795 and granddaughter of foundation hen No. 10011, produced 232 eggs; D, hen No. 6268, granddaughter of hen No. 1795, produced 274 eggs; E, hen No. 2553, great-granddaughter of hen No. 1795, produced 310 eggs. Photograph of hen No. 2553 was taken October 20, 1931, when she was in heavy molt after 13 months' steady laying

egg-producing ability. Recent studies at the animal husbandry experiment farm furnished additional confirmation of this point, indicating that there is no significant correlation between head and body measurements of live birds and egg production in White Leghorns or Rhode Island Reds. Skeletal measurements of a small group of White Leg-

horns likewise failed to show any close correlation with egg production. Consequently, there seems to be little basis for the belief that, in the domestic fowl, body conformation is a reliable indication of

egg-laying ability.

It is well known, however, that the ability of a bird to lay consistently at a high rate is unquestionably inherited, and, as already mentioned, hatchability and egg size are likewise inherited traits. The economic importance of hatchability is evident from the fact that one-third of all eggs incubated annually fail to hatch. From a breeding standpoint, a male with a large number of high-producing sisters and half sisters may often be disappointing in the number of progeny sired, because he carries factors for low hatchability. Likewise, a high-producing female may be unsatisfactory because of the poor hatching quality of her eggs. A high-producing hen is desirable for further use in the breeding pen if from 85 to 90 per cent of her eggs hatch and if she has 8 to 10 daughters of high uniform production.

# Large Production for Long Periods Is Sign of Vigor

The mode of inheritance of egg size has not yet been determined accurately because the factors affecting the mean weight of eggs during the first year of a hen's production are apparently numerous. The results of a few investigations indicate that small egg size is dominant over large egg size; therefore, the use of hens laying small eggs, or the use of their sons as breeders, should be avoided. Size of eggs is important because it is closely correlated with size of chicks hatched. Individual variations in size of egg may account for wide differences in amount of profit per hen. Eggs weighing less than 2 ounces should not be used for hatching.

Breeding for efficiency in both production and reproduction must be based also on vigor in the stock and freedom from disease. Sedulous care in feeding and management of the chicks will not be effective in overcoming the handicaps of inherited defects. A large production of eggs for long periods is an indication of vigor and chicks from vigorous stocks are relatively easy to rear. Annual replacement costs can be reduced when stock is capable of producing profitably for two

years.

When a farm flock owner does not find it practicable to conduct trap nesting and progeny testing, an effective means of increasing flock-production efficiency is the purchase of pedigreed baby chicks or breeding males of known high-producing ancestry.

J. P. Quinn, Bureau of Animal Industry.

GGS Oiled by Vacuum Carbon Dioxide Method Keep Better in Storage

Shell eggs are one of the most perishable of food products that are stored for long periods of time. The eggs removed in November,

December, and January, after several months of storage, generally have distinct "storage flavors," or weaknesses not present in fresh eggs. Many attempts to prevent this deterioration have been made.

Various preservative treatments have been suggested, some for eggs stored under refrigeration and some for those held at ordinary temperatures. In recent years, the use of colorless and tasteless mineral

oils to seal the shell pores and to prevent evaporation and other

changes in eggs during storage has gradually increased.

In studying this method of preserving eggs it was found that the eggs could be better sealed and preserved if the oil was forced through the shell pores. Consequently the Bureau of Chemistry and Soils developed a new method of treating eggs which consists essentially in drawing out by means of a vacuum, a portion of the air normally present in the egg, coating the shell thinly with oil, and releasing the vacuum with carbon dioxide gas. The return to normal air pressure carries the oil into the shell pores and effectively seals them. Studies have shown that the oil does not penetrate to the inside of the egg, but remains between the shell and the membranes. As a large portion of the oil is drawn to the inner surface of the shell the eggs dry quickly and have a less oily appearance than eggs oiled by the ordinary methods. This is an advantage in handling and retailing.

# Acidity Important in Egg Quality

Acidity is important in maintaining egg quality. One factor which influences the amount of acid in shell eggs is the gas, carbon dioxide. This gas is lost through the pores of the normal egg; its loss causing a marked decline in acidity. In oiling shell eggs, the Bureau of Chemistry and Soils has found that releasing the vacuum with carbon dioxide gas rather than with air aids markedly in maintaining the acidity or hydrogen-ion content of the egg white. Eggs treated in this

way stand up better in storage than do the open-dipped eggs.

That the vacuum carbon dioxide method has merit is shown by comparisons under well-controlled conditions with unoiled eggs, and with eggs oiled by other methods. Experiments in which the eggs were treated and graded in the laboratory and stored in a commercial egg-storage room showed that during 11 months' storage the unoiled eggs lost 7.71 per cent of their weight, and the open-dipped eggs lost 1.6 per cent, whereas the vacuum carbon dioxide-dipped eggs lost only 0.1 per cent of their total weight. The fall in grade was equally striking. After 11 months' storage none of the unoiled eggs were in the two top grades (Specials and Extras), whereas 30.14 per cent of the open-dipped eggs and 46.7 per cent of the vacuum carbon dioxide-dipped eggs were classed in these grades.

The unoiled eggs showed an average pH of 8.99, the open-dipped eggs an average pH of 8.63, and the vacuum carbon dioxide-treated eggs an average pH of 8.2. The additional acidity in the carbon dioxide-treated eggs aids materially in maintaining egg quality.

Several hundred cases of high-grade eggs have been oiled by the vacuum carbon dioxide method and are being stored under commercial conditions. These studies should indicate whether the application of the new method to commercial practice is feasible.

LAWRENCE H. James, and T. L. Swenson, Bureau of Chemistry and Soils.

RGOT Importations Are Tested for Quality and Purity by U. S. Officials

Rye is subject to a disease, caused by a parasitic fungus, ergot, which is disastrous to the rye itself, but which results in the production of a useful drug.

Farmers in this country make every effort to keep this disease out of their fields. Nevertheless, even in the United States, some ergotized rye is found. The millers adopt means of sifting it out of the rye because the tungus is poisonous. These siftings might, perhaps, be utilized to furnish a supply of the drug, but apparently this has not been regarded as profitable here. In Europe, however, where ergot in rye is much more common than in this country, the drug is gathered in ton quantities. Farmers in Europe collect this material and sell it to drug dealers who dry it carefully to prevent its becoming moldy, then preserve it in warehouses where it can be kept dry and free from worm or insect infestation. These dealers, located principally in Spain, Portugal, Germany, Russia, and Poland, ship the drug all over the world.

If not properly kept, ergot readily deteriorates, becoming moldy and worm-infested. The Federal food and drugs act prohibits the importation into this country of the deteriorated drug. It is the duty of the Federal Food and Drug Administration to see that only the pure drug gains entrance at our ports. To accomplish this, all importations, before they are delivered to the American purchaser, are subjected to Federal examination. Not only is the drug required to be free from deterioration, as judged by its general appearance, but it is tested to determine whether it possesses the medicinal quality for which it will be used.

Uses of Ergot

Ergot has been used in this country for more than 100 years to prevent hemorrhage after childbirth. At the present time, other drugs, more quickly acting, are replacing ergot to a considerable extent. Even so, a considerable amount of the drug is still used and under some circumstances, there is no better medicinal agent. For a long time it was not known what particular constituent was responsible for the drug's effects. This lack of information sometimes led to the preparation of the drug in a way which we now know resulted in discarding the really important principle and retaining worthless constituents. Increased knowledge of the drug's character has enabled manufacturers to prepare for physicians a potent, uniform, and reliable preparation. The Food and Drug Administration continuously surveys crude ergot on the American market, as well as preparations made from it, upon which the physician depends in his practice.

Efforts have been made to determine the potency of the drug by chemical means. While some encouraging results have been obtained, the only methods generally accepted as giving certain and accurate estimates are what are known as biological-assay tests. The law requires these processes to involve actual experiments upon animals. Loss of human life might result if the drug were not up to legal standard. The only test which is legal under the Federal food and drugs act requires the use of roosters. Briefly described, this test consists in observing the effect on the rooster's comb when the liquid ergot preparation is injected by means of a hypodermic syringe. If the drug is potent, as it ought to be, it will constrict the blood vessels in the comb, preventing the free circulation of blood, thereby changing the normal, healthy, red color of the comb to a dull purplish tint. If the drug fails to produce this effect, it is not potent and, if administered to a patient, would not be as effective as the doctor has a right to expect.

If the drug does not meet legal standards, the Department of Agriculture refuses to permit its entry into this country. If the article

tested is an ergot preparation being distributed in inter-tate commerce in the United States, and if it falls below the required standard, the consignment is seized and destroyed or otherwise disposed of in such a way that it will not be used for medicine.

W. T. McClosky, Food and Drug Administration.

ROSION Control Proves Successful on Ranges in Southeast Oregon Forest officers and stockmen on the Fremont National Forestin southeastern Oregon are making notable progress in the control of erosion. They are

also carrying on practical everyday research in determining the types of

dams best suited to the different soil, slopes, and weather conditions of the region.

The Fremont Forest is a high plateau containing almost a million acres. Throughout this area are many mountain meadows and upland grass and sage prairies which furnish much forage for sheep and cattle. On these areas gully erosion threatens to become a menace, and the control work is being done here.

Erosion found on the Fremont Forest is caused by a combination of factors but is principally due to three causes:

(1) Disappearance of beaver and beaver dams which at one time assisted greatly in storing water and preventing gully washing during flood periods.



Fig. tree 45—4 simple dam of brush is very effective in removing much of the soil from the water as it filters through the dam

during flood periods.

(2) An extended period of drought which greatly reduced the growth of soil-binding vegetation.

(3) Rodent infestation, honeycombing and aerating the soil.

Keeping the soil continuously covered with a complete stand of vegetation is the only certain method of preventing erosion, and this is the objective toward which local forest officers are working.

Legislative action for the protection of beaver has been obtained, and the Bureau of Biological Survey, the Forest Service, and stockmen are cooperating to exterminate ground squirrels. Simple, practical, range-management plans, providing for deferred and rotation.



FIGURE 46 —W here they are available, rocks make very suitable material for dams

grazing, have been developed for improving both the quality and the quantity of vegetation.

Érosion damage is being repaired and further erosion prevented by dams designed (1) to check the force of flow and cutting power of the water and (2) to fill up the gullies. (Fig. 45.) Dams of rock, brush, and combinations of these materials have been employed and have been made to serve the double purpose of preventing the undermining and cutting action of the water and at the same time of building up a

dirt fill. (Fig. 46.)
Already the work is bearing fruit. In the

larger gullies—10 to 15 feet wide and 10 feet deep—where several dams have been built in series, each succeeding run-off brings down its load of silt and drift débris and deposits it behind the structures to build up fills so that in many cases the original level of the land is being

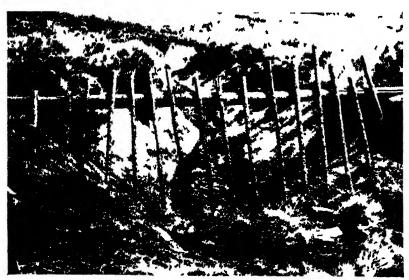


FIGURE 47.—Woven wire placed across gullies collects drift and soil and reduces the force of flow

rapidly restored. Smaller structures placed near the heads of channels

are very effectively checking further erosion.

To be successful (fig 47), erosion control must stop gullying while the gullies are small, and it is by doing this that the work on the Fremont Forest has been so effective. Moreover, the work has been done without appropriation and expenditure of large sums of money, much of it being incidental to the regular duties of local rangels.

W. L. DUTTON, Forest Service.

EXTENSION Records Show
That Improved Practices
Pay in Poultry Profits

The poultry industry has always been beset with schemes that look well on paper but fail when put into practical operation. The exten-

sion poultry specialists and county agents, who come in daily contact with the farmers and commercial poultrymen, do not take up with alluring get-rich-quick ventures. They have found it more practical to recommend and advocate improved practices that are backed up by scientific information and that have a demonstrated value. In many instances such practices have proved successful, not only with individual cases but with large numbers of cooperators. An excellent illustration is the "Grow Healthy Chicks" program now being carried out in more than 40 States. This plan emphasizes fundamental flockmanagement points in raising the pullets. These practices include the use of vigorous, disease-free breeding stock; clean, sanitary ranges; and clean and efficient feeding. In Missouri the yearly records of over 100 farms were collected and analyzed to check up the results of this "Grow Healthy Chicks" campaign. It was found that the farmers following the Missouri plan obtained 166 eggs per bird, while those following ordinary methods were able to gather only 139 eggs per bird—a difference of 27 eggs. This increased production was highly profitable, for it was found that where the improved practice was followed, the return from the average hen in the flock, above the cost of feeding, was 74 cents more than the return from the average hen in flocks in which ordinary raising methods were followed.

# Control of Disease of Turkeys

In recent years science has contributed much toward the control of that dreaded disease in turkeys known as blackhead. New methods of combating this disease have been evolved, and a turkey-management system has been perfected, so that blackhead is not the menace it once was in the turkey industry. The blackhead disease drove Turkey production from the New England States to the Middle West, and from there to the great open spaces of the West and Southwest. The Oregon Extension Service has been active in promoting better methods of turkey management in rearing, feeding, and dressing. An excellent illustration of the results of improved practices which brought increased profits was furnished by a flock which matured 408 turkeys from 29 breeding hens. These birds, when dressed for market, graded 99.7 per cent prime and choice, while the average producer in the Oregon turkey pool had only 87.6 per cent prime and choice birds. Twelve per cent more top-grade turkeys, with a higher price of 5 or 6 cents per pound, amounts to a very material increase in returns.

An excellent example of the practicability of a disease-prevention program comes from Connecticut. Here many flocks were visited each fall by an outbreak of fowl pox, more commonly called chickenpox. Though this disease is seldom fatal, yet the decrease in production and the loss in efficiency of the hen are factors in the annual income.

A quick and inexpensive method of immunizing the pullets was developed, and arrangements were made for a laboratory to prepare and distribute a vaccine. The method perfected consisted in taking growing pullets about 10 weeks old, plucking four or five feathers from the leg of each, and painting the spot with the liquid vaccine. In one year over 80,000 birds were vaccinated, and records of the egg production from these flocks were compared with those from flocks composed of 30,000 birds which were not vaccinated. This comparison showed an average difference of 5½ eggs per bird, in favor of the vaccinated birds.

# Results of Flock Management Program

Whenever a recommendation covers a variety of points it is always more difficult to show definite results than from a single practice. In Illinois a complete sanitary flock-management program for the laying flock has been developed. This includes: (1) Confining the birds to a double-yarding system, allowing them outside runs on sunny winter days; (2) applying certain biological tests to mature birds; (3) equipping poultry houses with proper ventilation and sanitation devices and thoroughly cleaning and disinfecting them regularly; (4) raising all young chicks on clean range away from the old stock. This long list of improved practices limits the number of persons who can qualify, yet 50 owners who carried out all the points, were found. The records of their flocks, when compared with the records of flocks on 196 farms on which the specifications could not be complied with, showed a marked improvement. Flocks on the farms on which the sanitation program was carried out produced 27 more eggs per bird, and a labor income of 61 cents more per bird, than did the flocks on the farms where the measures were not carried out.

One interesting point in these records is that the total investment per hen in the sanitation flocks was only \$4.14, whereas in the non-sanitation flocks the investment was \$4.69. In other words, these flocks were practical farm flocks, not millionaires' playthings. The selling price per dozen eggs was 1 cent more on the sanitation farms, and the feed cost per dozen eggs was 3 cents less. This low investment, coupled with a better average selling price and low feed cost, explains the difference of 61 cents labor income per bird.

It is by such records that the poultry extension specialists and county agents show the flockowner that the practices advocated are practical and bring about increased profits.

H. L. SHRADER. Extension Service.

Emphasize Milk Quality in Cooperative Program

Milk, pleasing to the taste, clean, safe, and with good keeping qualities, produced under sanitary conditions, is what the consuming public

desires. Such milk stimulates consumption and, therefore, benefits the dairyman producing it. The same principles hold true for the products made from milk, such as butter, cheese, and ice cream.

A number of State dairy specialists have incorporated in their programs methods for instructing dairymen in the few simple and easily applied steps in producing a high-quality product. Every year the dairymen of this country are handicapped by having to take a preventable loss running into millions of dollars, because of off-flavor sour milk, or milk of high bacterial count. The reduction of this loss to the dairymen and the creation of a greater satisfaction on the part of the consuming public, with the resulting increase in consumption of milk, is the goal of extension effort.

The methods of attack on the problem of low-quality milk are varied. They can be grouped, however, into three general divisions: (1) Educational work with adults, (2) 4-H milk-quality-improvement clubs,

and (3) area-improvement plans.

The educational work with adults is now being carried on in a number of States. A plan for a project, describing the manner in which such work can be conducted, is available in mimeographed form. The plans contemplate the use of a wide variety of extension methods and includes surveys, publicity, meetings, circular letters, exhibits, and motion pictures. The Federal extension forces cooperate with the State departments of agriculture and public health, and with local health authorities, milk producers' associations, milk dealers, and the leading dairymen.

# 4-H Clubs Cooperate

The 4-H milk-quality-improvement clubs are organized for the purpose of training boys and girls in methods of producing a high grade of milk. These boys and girls will be the leading dairymen, dairywomen, and dairy leaders of their generation. Upon the foundation laid now will largely depend a continuance of progress in improving the quality of milk. The suggested project work for such clubs has been prepared as a series of tests and comparisons on milk samples which are to be studied by the members and handled in certain ways in order to bring out the benefits of certain production methods.

The area plan closely links up educational work with adults and regulatory work in a given area, and offers to smaller towns and communities the same satisfactory supervison of milk supplies that is enjoyed by large cities. The educational work on production of high-quality milk is conducted with the dairymen in the same manner as in the adult work above outlined. The field of operations, however, is a definite area, such as a county or a number of towns and communities within a limited radius. In addition to the educational program with the producers, sentiment is developed with consumers, dealers, and town and county officials, in cooperation with the representatives of the State departments of agriculture and public health for a safe supervision of milk supplies. The establishment of a well-equipped laboratory with a trained worker and a field inspector in each area is made possible by the cooperation of the various towns and communities within the area, these units financing the laboratory with contributions in proportion to their populations.

The three phases of this work have been developed for one purpose—improving the quality of milk. Improvement of milk quality is essentially an agricultural problem and responsibility. Extension agencies should supply the leadership. In no way need this program interfere with the regulatory work of the constituted authorities; rather it supplements that work. Such a program lays the groundwork for

better-quality milk, creates sentiment on the part of the producer, consumer, and dealer for better-quality milk and forms an important part of the plan of dairy extension work in every State.

JOSEPH B. PARKER, Estension Service.

XTENSION Work in Hawaii Has Many Problems Not Found on the Mainland

Cooperative extension work was established in the Territory of

Found on the Mainland Hawaii November 1, 1928. The Smith-Lever Act, May 8, 1914, establishing cooperative extension work between the United States Department of Agriculture and the land-grant colleges in the several States, had not included the Territories in its provisions. Boys' and girls' clubs, somewhat similar to those of the mainland, also were established by the Federal experiment station. The University of Hawaii for many years previous to 1928 had been receiving small appropriations from the Territorial Legislature for extension work.

The Territory of Hawaii is made up of an archipelago in mid-Pacific and lies wholly within the Tropics. Climatically it is subtropical rather than tropical. Rainfall in different localities is exceedingly variable, depending upon the altitude and on whether the land exposure is to windward or leeward. The annual rainfall varies from 0 to over 400 inches. The soil is of volcanic origin and is fairly fertile. Large quantities of chemical fertilizer are used in crop production. There are five major islands extending 400 miles from northwest to southeast; Kauai, Oahu, Molokai, Maui, and Hawaii. Other smaller islands of some importance are Niihau, Kahoolawe, and Lanai. The total land area is 6,407 square miles, or about that of Connecticut and Rhode Island combined. There are 310,000 acres in cultivation. While Hawaii is primarily agricultural, there are few farmers in the mainland sense. Hawaii's agriculture is under the control of a few large corporations and a number of somewhat smaller companies. The 1930 Federal census shows 4,794 farmers. Sixty-two per cent of the value of the agricultural output of the islands is in sugarcane and 30 per cent in pineapple products. These are produced on great plantations operated by corporations with indentured labor, at present mostly Filipinos and Japanese. The beef-cattle industry, which ranks third, amounts to only 2 per cent, coffee to 1.31 per cent, dairying to 1.12 per cent, poultry to 1 per cent, and rice to 0.534 per cent.

# Population is of Many Races

The island population (568,336) is quite cosmopolitan, orientals predominating. The most important elements other than the native Hawaiian are Chinese, Japanese, Koreans, Filipinos, Portuguese, and Scotch, and a few other Europeans, and Americans from the States. The schools are excellent. English is spoken by all of the younger generation and is the language of business and society. The title to the land is held mostly by a few large estates, and most of the large plantations as well as the small farmers operate under leasehold. Camps for the families of plantation laborers consist of small frame cottages, each usually equipped with running water, electric lights, a sewage disposal system, a bath, and laundry facilities. The agricultural products other than sugar and pineapples consist of rice, coffee, poultry, dairy and livestock products, bananas, papayas, avocados, citrus fruits, and vegetables. This small production is carried on by Chinese, Japanese, Portuguese, and a few Hawaiian farmers. The agricultural extension service is organized as one of the units of the University of Hawaii. There are two assistant directors, one for agriculture and one for home economics, each being in charge of all extension work in his respective field. There are 10 county extension agents, 5 each in agriculture and home economics. There are territorial agents in animal husbandry, forestry, marketing, and sugar technology. The extension staff is well trained, its members being graduates of the University of Hawaii or of mainland colleges. Four employees have had extension experience in the States. Entire salaries and all expenses of the staff, including the county extension agents, are paid by the University of Hawaii and the United States Department of Agriculture. The home-economics extension work is done through home-demonstration clubs, and the agricultural work through individuals or community and commodity groups. The boys and girls' 4-H extension clubs are identical with the organizations on the mainland.

#### Character of the Extension Work

Extension work in the Territory is quite different from the work in the States. The two leading crops, sugar and pineapples, each support great research organizations of their own. The sugar-planters' experiment station has an annual budget of \$525,000, and the experiment station supported by the Hawaiian pineapple canners has an annual budget of \$350,000. Under the system of corporation farming with indentured labor, it is possible for the corporations to put into immediate practice the results of research. The effectiveness of this system is manifest by the enormous yields and the high-quality product. As much as 18 tons of raw sugar and 20 to 30 tons of high-class pineapples are produced per acre. The fringe of farming outside of pineapples and sugarcane is carried on for the most part on land operated under leasehold. The principal agricultural enterprises open for extension work are coffee, bananas, rice, fruit, swine production, home gardening, poultry, and dairying. There are a few range-livestock outfits operated on a very extensive scale, such as the Parker ranch which has 30,000 purebred and high-grade Herefords. This ranch probably has the largest purebred herd of Herefords in the world.

The opportunities for community groups in cooperative organizations are handicapped by the great mixture of races and people unable to understand each other. This is gradually being changed as the present generation of young people comes into adulthood. (Fig. 48.) Even under existing conditions, however, the extension service has made a remarkable showing.

# Rat-Control Campaign

In the Kona region of the island of Hawaii, rats have been a serious pest on coffee farms, most of which are operated by Japanese. It is estimated that in that region rats take an annual toll of at least \$100,000. Before the beginning of the extension work this had been accepted as something impossible to be controlled. The county extension agent in 1929 organized a rat-killing campaign through the

boys and girls' clubs and the campaign accounted for 3,000 rats in a very brief period. This was repeated in 1930 and more than 10,000 rats were disposed of. The estimated saving in a year as a result of

this campaign amounted to \$50,000.

On the island of Kauai the county extension agent cooperated with the rice growers. This industry, which was once of considerable importance in the Territory, has been rapidly disappearing due to a number of causes, among others devastation by the rice borer. Control methods have been developed through parasites brought in from the Orient. The county agent procured and released these larval parasites and also instructed growers in the use of light traps.

While Hawaii has some well-managed range pasture lands, there are evidences of overgrazing and the disappearance of native grasses. The



FIGURE 48.—A girls' 4-H club, meeting with the home-demonstration agent, Kalapana, Hawan

county agents have cooperated with the large ranches in conducting cooperative pasture tests.

The islands bring in from the States alarge part of the poultry products consumed. There are a few commercial poultry plants but most of the poultry is raised in comparatively small lots. The county agents have assisted poultry raisers in culling, housing, economic feeding, and management. Particularly have they helped them in controlling sorehead,

a terrible disease in the Tropics. Mosquitoes are carriers of this disease. Above-ground, mosquito-proof houses are constructed to

house the chicks until they are well grown.

Most of all, small farmers need organized marketing. The market situation in the city of Honolulu is deplorable. There is no standardization of varieties, and no attempt has been made to control surplus. As a consequence there are frequent periods of glut and of scarcity. Most of the vegetables are grown by orientals and are the varieties with which they are familiar. The flavor of these vegetables is not relished at first by those not accustomed to them. The extension service is gradually introducing better commercial varieties.

#### Home-Demonstration Work

Extension work with women also presents unusual difficulties. Very rarely do the rural women speak English. They are isolated. There is little community or social life. They want their children to be American, to eat American food, and to dress in American fashion, and they are proud of their advancement in American ways. It requires much patience to teach these women, but they amply repay it with

affection, earnestness, and faithfulness once their interest is aroused. Imagine the lost feeling an extension agent must have in meeting with a group of 10 or more women when 4 or 5 different languages are spoken, not more than 2 of the group being able to speak to each other, and perhaps no one able to speak to the demonstrator. Such situations must be met. The demonstrations must be simple and tell their own story. The lessons frequently must be translated into 3 Filipino dialects-Visayan, Tagalog, and Ilocano-each as distinct from the other as French from English; and perhaps also into Portuguese, Chinese, Japanese, or Korean. Some of the homes are well furnished (American way) but in most of them there is pathetically little. The homedemonstration agents have shown the women how to make ovens out of 5-gallon oil cans, how to make iceless refrigerators and window coolers. Often the families do not like American vegetables and can not get the oriental varieties. As a result, far too few vegetables are eaten under conditions where they could be produced abundantly. The same is true of fruits. Too little milk is used. Orientals are not accustomed to it and have to learn to like it. Malnutrition and some nutritive diseases exist. Teeth are bad almost universally and sore eyes are a common malady. Much health work has been done by plantation nurses and doctors, but the extension service has been the first to go into the homes and show the women how to cook with their crude equipment so that they will like the vegetables. Racial likes and dislikes have to be understood and observed if progress is to be made. Leaders are being found and are developing enthusiasm and skill in demonstration. The older women adhere to the conventional dress of their native lands but the daughters "go American" and are as proud of pretty clothes as debutantes and want them "made right." Clothing work is popular and many of the girls become deft seamstresses. At the outset much of the extension work with women was necessarily individual, but in the past year home-demonstration clubs have been organized. Women's vacation camps have been held during each of the past two years and are becoming increasingly popular. The women take kindly to games and folk dances and nothing so quickly breaks down racial aloofness and bashfulness as playing together.

# Boys and Girls' Club Work

Boys and girls' 4-H extension clubs are popular. The children of all races like these clubs and here there is no language difficulty, as the young people speak English. It is an inspiring sight to witness the enthusiasm of these clubs, made up as some of them are, of native Hawaiians, Chinese, Japanese, and Portuguese, all repeating the club pledge in unison and giving the salute to the flag like the real Americans that they are. There are club camps and picnics on each of the islands and the clubs hold their regular monthly meetings, the children being very punctilious about their parliamentary practice. For the last two years there has been a big Territorial 4-H boys and girls' club camp at the University of Hawaii. During the year 1931 the various clubs earned sufficient money to pay the expenses of their own delegates to the Territorial camp. The clubs are of much the same kind as on the mainland, though there are a few that are peculiar to the islands, such as coffee, taro, frog, and banana clubs. The frog club has become quite popular, as it is a source of ready money. The chief drawback to boys and girls' 4-H extension clubs is that the children are employed in the canning factories and the fields during school vacations; also, among the Japanese, who compose the largest racial group, the children do double school duty. After the public schools are dismissed, Japanese children then go for a similar period to Japanese language schools. In spite of this, however, the children of this race make up a considerable part of the club enrollment, due to their ambition for education and advancement. In 1929 an island-born Japanese boy represented Hawaii at the National 4-H Club Camp in Washington, D. C. He was accompanied on his trip by a Chinese county agent. In 1930 there were 1,664 boys and girls enrolled in clubs.

WILLIAM A. LLOYD, Extension Service.

ARM Buildings Should Be Repainted Before Wood Weathering Begins

A good paint job is the best insurance against the necessity of early repainting. Use of inferior paint is poor economy. It is hard to distinguish

between good cheap paints and poor ones, and the cheap paint must be applied more skilfully if it is to give the best service. Paints of dark color are cheaper and more durable than white or light-colored paints of equal quality.

Good workmanship is even more essential than good paint. Stingy application saves paint at the expense of durability and appearance;

uneven application is fatal to both.

The first important change in a new paint coating is the collection of dirt. Discoloration is most conspicuous on white and light-colored surfaces and least noticeable on dark colors and grays. If pride in the appearance of his dwelling decides the owner to repaint it at this stage,

one coat of paint every two or three years will be enough.

If the coating does not become dirty enough to call for repainting, there may be a fading of the color, noticeable first on that part of the house or barn most exposed to sunlight. The coating is no longer glossy, and when the finger is rubbed over it, a chalklike powder comes off. Fading is most pronounced in paints of light colors containing large amounts of white pigment, with a smaller amount of coloring pigment.

Even after paint has faded considerably, repainting is not yet necessary except where looks are the first consideration. But it is time to

watch closely, because more serious changes may soon set in.

Perhaps the next change is a flaking or tearing loose of small pieces of the coating, leaving the wood beneath bare. It is now high time to repaint. Do not wait for the flaking to leave great areas of wood bare. It is hard to paint such a surface satisfactorily, and there is risk that the new coating will soon fail. (Fig. 49.)

# An Early Sign of Aging

In many paints an early sign of aging is the formation of tiny interlacing cracks in the coating. If on looking very closely you can see the wood beneath the cracks, or small yellow spots of iron rust over the nail fastenings, the coating no longer keeps the moisture out effectively, and the time has come to repaint. In wood weathering, the most serious form of damage to a paint job, larger cracks become visible, running parallel to the grain of the wood. An occasional board is found to be cupping outward, leaving a gap

between it and the board below, or pulling loose slightly at the joint with the corner board. In a badly neglected or abandoned house the boards become roughened, curled, and cracked like dead leaves, and no painter could put a decent coat of paint on them.

Flaking coatings can be restored by repainting, but wood that is roughened and twisted by weathering can not be repaired so easily, and it is dangerous to postpone repainting, after the appearance of signs indicating that the coating no longer protects the wood adequately.

Repainting the barn will usually be postponed a year or two

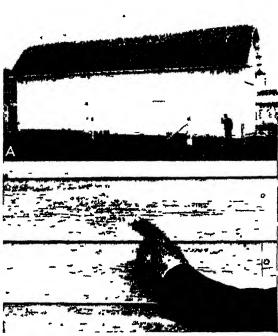


FIGURE 49.—Many a building appearing to be well painted, as the burn in A, on closer inspection will be found to have a paint coating that no longer gives protection, as is illustrated by the close-up B, of the same burn

after repainting the house, but it should not be deferred until the structure is flying distress signals.

F. L. Browne, Forest Products Laboratory.

ARMERS' Account Books, Diaries, Etc., Are Often Valuable Research Aids

The importance of preserving farmers' account books, diaries, letters, and reminiscences for the use of research workers is being realized

increasingly. Of similar significance are country-store account books, mill records, old farm periodicals and rural newspapers, pamphlets, reports and programs of agricultural societies, and pictures of all phases of rural life. These commonplace documents of the past are the necessary sources of the information used by historians and economists in making analyses of our past agricultural and economic life.

These materials supply research workers with many facts not obtainable elsewhere. They furnish data indicating the course of farmers' standards of living; they show the influence of the competition of various agricultural sections, the changing conditions and wages of farm labor, the ups and downs of various systems of farm management, and the trends of crop acreages. They afford figures on the cost of ferti-

lizers, machinery, twine, and other supplies and information on yields, disease epidemics, the dates of the introduction of new varieties and breeds, and new cultural practices. The country-store records throw light on the spread between rural and city prices and the changing margin between the cost and selling prices. Notable examples of what can be done with this type of price data are Arthur G. Peterson's Historical Study of Prices Received by Producers of Farm Products in Virginia, 1801–1927, issued as Virginia Agricultural Experiment Station Technical Bulletin 37, and the Maryland Agricultural Experiment Station Bulletin 321 by Roger F. Hale on Prices Paid for Maryland Farm Products, 1851–1927. Pamphlets and reports of agricultural societies are indispensable if we are to have accurate accounts of the part these organizations took in political movements, the contributions they made to the social side of rural life, and their attempts at cooperation.

The analyses by agricultural economists and historians offered to us in the form of articles, books, and bulletins have been listed in a Bibliography of the History of the Agriculture of the United States, issued by the United States Department of Agriculture as Miscellaneous Publication 84. These various studies show us how the present agricultural and economic conditions came about; they emphasize our agriculture as a result of development. They afford perspective, that is, a realization of what are the more permanent and what the more accidental and transient elements of present-day conditions Reading them broadens our sympathies, steadies our judgments, and

enlarges our experiences.

#### Preservation and Use of Materials

Various organizations have taken, and are taking, steps to preserve these materials from which the history of American agriculture may be written. Nearly all of the State historical societies and commissions have done something, and a few of them have done notable work in this direction. The Department of Agriculture, through its library and the division of statistical and historical research of its Bureau of Agricultural Economics, is cooperating with the Agricultural History Society in developing an agricultural-history collection as the national center of research in this subject. Gifts and information concerning the location of materials for this collection are welcomed. The Business Historical Society with headquarters in the George F. Baker Library, Soldiers Field, Boston, is actively collecting and promoting the preservation of business records, including farm records. The McCormick Historical Association in Chicago has gathered several hundred thousand items. The University of Virginia and the College of William and Mary are assembling materials pertaining to Virginia. At the University of North Carolina, J. G. de Roulhac Hamilton is directing the development of a national southern collection. The University of South Carolina has interested itself in the records of old plantations, and E. Merton Coulter of the University of Georgia has a notable collection of about 5,000 similar documents. The agricultural colleges of Cornell University and the University of Wisconsin are utilizing many old farm, mill, and creamery records in long-time price studies. The State Historical Society of Wisconsin and the Minnesota Historical Society have a considerable number of farmers' diaries and similar documents. In the Southwest, T. C. Richardson, field editor of Farm and Ranch, is head of a committee of the Texas Agricultural Workers' Association which is gathering and indexing material bearing on the agricultural, social, and economic development of Texas. (Fig. 50)

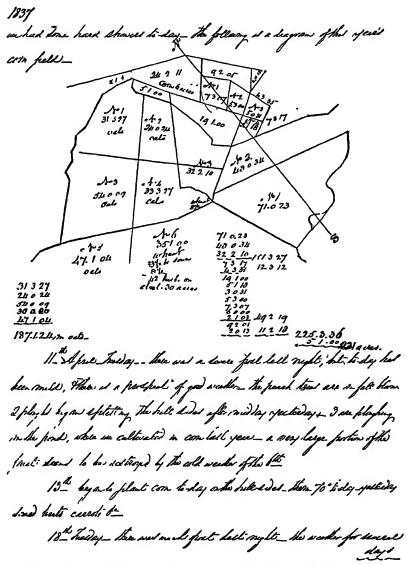


FIGURE 50.—Page from the agricultural journal of B. T. Tayloe of King George County, Va., in the possession of the library of the United States Department of Agriculture

#### Most Useful in Historical Collections

Having indicated the utility of these materials as sources of information on our agricultural life, it is hardly necessary to plead that they be given to historical collections. To preserve them is to show grati-

tude—an appreciation of the generation whose labors are therein recorded. It is also doing a great service to research workers, for they can use them to significant advantage. While the materials may possess a certain value to their owners, their perpetuity should not be menaced by failure to take steps to preserve them from destruction by fire and other disasters. It is hoped that readers of this article who have or know of materials of the kind here discussed will aid historical and economic research by giving them to historical collections or depositing them with such collections. There they will be classified, filed in fireproof cases, and made forever accessible to research workers.

EVERETT E. EDWARDS, Bureau of Agricultural Economics.

Reflect Business and Financial Conditions

The general depression of 1930 and 1931 is one of many that have almost periodically marred the industrial and agricultural progress of the United

States. Most farmers remember the previous major depression of 1920-21 when prices of farm products fell drastically and left many

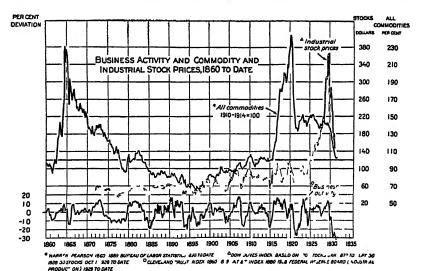


Figure 51 —The business depression of 1930-31 is one of many that have marked the industrial and agricultural progress of the United States. Like those of the 1870's, 1890's and 1920-21, it is characterized by a drastic decline in commodity prices, both agricultural and nonagricultural

with debts incurred during the hopeful prosperous years of 1918–19. Others may remember the business depression after 1893 when prices fell to abnormally low levels, leaving farmers stranded with high debts and expenditures. And a few may recall the protracted decline in prices during the long depression after 1873. Many other depressions (fig. 51) have intervened between these major ones but these three were more nearly like the present one in that the greatest damage done to agriculture came as the result of great reductions in farm prices and in farm incomes.

Between June, 1920, and June, 1921, the level of all farm prices in the United States was reduced by more than one-half (from 234 per cent of pre-war prices to 110 per cent). Between October, 1929, and October, 1931, they were again reduced by more than one-half (from 140 per cent of pre-war prices to 68 per cent). In this depression as in the others the falling prices made farm mortgages, other debts, farm taxes, and even current operating expenses additionally burdensome.

The effect of the business depression is readily seen in the gross income from the total agricultural production of the three seasons 1929, 1930, and 1931. For the production of 1929, when the country was generally considered to be in a state of prosperity, with very little unemployment and nearly everybody happy and hopeful, farmers received a gross income of \$11,900,000,000. In 1930, the total farm production was about 2 per cent less than in 1929, but prices, instead of being higher as they normally are for smaller production, fell sharply as the 1930 depression developed here and abroad. The result was that farmers received only \$9,300,000,000 for a smaller volume. In 1931, the total production was somewhat larger than that of 1930, but prices, still affected by the business depression, continued to still lower levels greatly out of proportion to the larger output of such cash crops as cotton, corn, and potatoes. Consequently gross farm income was further reduced from \$9,300.000,000 in 1930 to \$6,900,000,000,000 in 1931. The reduction in two years amounted to more than 40 per cent.

# Certain Expenses Lower

Part of this decline in gross income in 1930 was offset by somewhat lower prices of farm supplies and farm labor, but farm taxes and interest on farm debts remained practically unchanged. The effect was an abnormally low net income barely sufficient to reward the average farmer for the physical labor he and his family put into the 1930 production. He received practically nothing for his capital or for managing the farm. During 1931, prices of goods bought by farmers fell still more. Farm wages also declined again as more city people joined the ranks of the jobless, some of them seeking jobs on farms. But taxes and interest remained practically at their previous high levels. Consequently the 1931 returns from agricultural production were insufficient to give the average farmer either an adequate reward for his labor or for his capital. In this respect the 1931 business depression treated farmers even worse than did the 1921 depression.

# Specific Results of the Depression

What are some of the specific ways in which the 1930-31 business depression here and in other countries registered itself in lower farm prices and in lower net farm incomes? In the case of cotton the reduction in industrial activity which set in after June, 1929, was accompanied by a reduction in the domestic mill consumption of cotton. (Fig. 52.) This reduced industrial demand, together with similar developments abroad, brought about an accumulation of unused cotton, and a drastic drop in the price of raw cotton from 17.9 cents per pound in June, 1929, to 7.7 cents in June, 1931. By this time much of the cotton goods in retail stores had been consumed.

and prices had fallen so low that mill consumption of cotton here and in other textile centers increased. For similar reasons cotton consumption expanded during 1921 while business in general was still The favorable growing season of 1931, however, improved crop prospects and more than offset a 10 per cent reduction in cotton acreage. By October 15 the farm price of cotton had fallen to 5.3

cents per pound, the lowest in over 30 years.

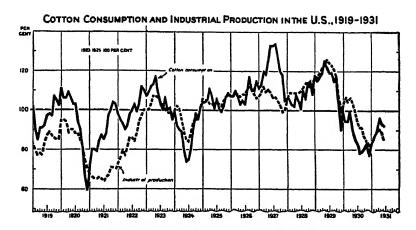
The consumption of tobacco was also materially affected by the decline in industrial activity. For example, in recent years it has been usual for cigarette consumption to increase anywhere from 3,000,000,000 to 13,000,000,000 cigarettes per year depending on the condition of business in general. (Fig. 52.) But in 1930, for the first time in many years, there was practically no increase and in 1931, as business conditions became still more depressed, cigarette consumption actually fell below that of 1930 by about 4,000,000,000. This failure to make the usual expansion in cigarette consumption in 1930, and the actual decrease in 1931, together with reduced demand in other uses of tobacco, were of course reflected in lower prices of

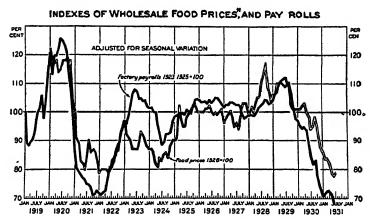
tobacco received by the grower.

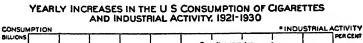
For somewhat similar reasons producers of food products received lower prices in 1930 and 1931 than in 1929. Among the food commodities we find some instances where the effect of the depression was to curtail consumption. In others, prices fell because consumers, though purchasing the same quantities, were unable to pay as much as formerly. In the case of butter, the reduced purchasing power of consumers in the fall of 1929 brought about an accumulation of storage holdings which helped to bring about very low prices in the winter of 1929-30. (Fig. 52.) Meat animals serve as a good illustration of commodities the prices of which fall because consumers, while continuing to take about the same quantities, are unable to pay as much as formerly because of reduced incomes. During the past 11 years there has therefore been a fairly close relation between food prices in the United States and business conditions as reflected in factory pay rolls. (Fig. 52.)

# Price Changes and the Business Situation

The prices of foods which are largely sold in the domestic markets and the purchasing power of domestic consumers as indicated by factory pay rolls, both experienced the boom of 1920, the great depression of 1921, the recovery of 1923, and the two cyclical fluctuations between 1924 and 1930. In 1923 food prices failed to rise as much as the recovery in the business situation warranted, but this failure was the result of burdensome supplies of food products. Another difference occurred in 1927 when factory pay rolls reached their low point a few months after food prices did. The greater general rise in these food prices since 1924 than that shown by factory pay rolls is due to the marked advances in beef prices due to a shortage of cattle, the peak of the beef-price cycle occurring in the last part of 1928. In spite of these differences, however, there has been a very definite reflection of the ups and downs in business and of the accompanying fluctuations in the wholesale prices of foods in the United States. Evidently wholesale dealers pay farmers more or less depending on the state of business.







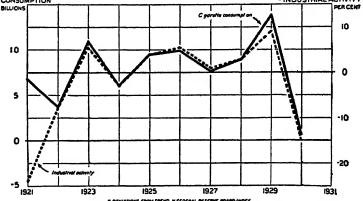


FIGURE 52 —There is a striking resemblance between certain indexes of industrial consumption on the one hand, and price or consumption indexes for certain agricultural products on the other

The ability of dealers in the wholesale markets to pay more or less depends, of course, on what they in turn are able to sell their wares for in the retail markets. This does not, however, mean that there is an exact correspondence between variations in wholesale and retail prices. Sometimes several weeks or months may elapse before prices on the retail markets are advanced or lowered in response to business conditions which have already affected wholesale prices. This was true in the fall of 1930 when butter prices to consumers were reduced some time after the reductions in the wholesale price, and a similar lag of retail prices after wholesale prices appears to exist in the case of meats. This failure of retail prices to show a response to business conditions as soon as wholesale prices do, may be due to the fact that retailers are more reluctant to vary their prices and that consumers can often continue to pay or continue to obtain credit for some time after their earnings have been reduced.

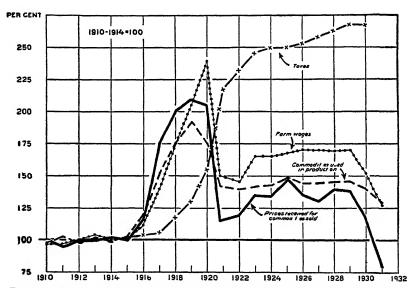


Figure 53 —Indexes of prices received by farmers and prices paid for commodities used in production, firm wages, and farm taxes, 1910-1931

The ways in which business affects wheat prices are not as clear as in the case of other food products. More than those of many other commodities, wheat prices are determined by world conditions as well as domestic. Being more of a necessity, wheat is less subject to variations in demand than are other farm products. In the business depression of 1920–21, wheat prices fell as did practically all prices and then continued at low levels until the 1924 shortage lifted them above the general price level. Between 1924 and 1929, their tendency has been downward, with some interruptions due to variations in domestic and foreign supplies. Taking into account domestic supplies and foreign demand for United States wheat, the average price received by growers for the 1929, 1930, and 1931 production was considerably less than they would have received had there been no breaks in the stock market since September, 1929, no business recession, and no general world-wide decline in commodity prices. That difference

is represented by most of the gap between the farm price of wheat in October, 1929, \$1.12 per bushel, and a price of only 36 cents per bushel in October, 1931.

# Disparity Between Income And Outgo

From the farmers' standpoint, the greatest hardship that is created by major industrial depressions is the wide discrepancy between prices received by farmers and the prices paid by them, the narrowing of the gap between income and outgo. When prices were reduced by nearly 55 per cent in a period of only a year during the 1920–21 depression, the prices of goods bought by farmers for production purposes fell from 192 per cent of pre-war levels (in December, 1919) to 142 per cent (in December, 1921), a decline of about 25 per cent. Farm wages declined from 239 per cent (of pre-war levels) in 1920 to 150 in 1921—a drop of 37 per cent. Taxes on farm property actually advanced from 155 per cent of pre-war levels in 1920 to 217 per cent in 1921 or an

increase of 40 per cent at a most inopportune moment.

The 1930-31 depression has again widened the disparity between certain farm costs and farm receipts. During the 2-year interval between October, 1929, and October, 1931, when farm prices were cut in half and gross returns were reduced by about 40 per cent, prices of commodities used in farm production declined from 146 per cent of pre-war levels to about 123, or about 15 per cent. Farm wages, as in the 1920-21 depression, again declined more than the prices of commodities used in production, the decline in this case being from 174 per cent of pre-war levels to 113 per cent, or a drop of 36 per cent. But taxes on farm property, which reached a post-war peak of 267 per cent of pre-war levels in 1929, remained practically unchanged as prices of most commodities and services fell. The total farm-mortgage debt during the 1930-31 depression was also greater than during the 1920-21 depression and this has meant a greater drain on shrunken farm receipts. It is the failure of these and other cost items to contract when receipts are being halved by financial conditions and decreased demand, and the necessity of keeping the farm running, that leave the average farmer with no net income for his capital and labor during periods of industrial depressions.

L. H. Bean, Bureau of Agricultural Economics.

Fire Control Motorized in the Lake States Forest - Land Area

Suppression of forest fires is beginning to reflect the increasing use of the gasoline motor. Fire fighters no longer rely entirely upon man power and hand tools.

The Lake States, having relatively smooth topography, a large mileage of roads, and numerous lakes and streams, favor the use of such motor-

driven equipment as trucks, tractors, and pumps.

Fire fighters travel mainly with trucks. The single fire guard or smoke-chaser may use a light car with a "pick-up" body. It will carry from one to four men besides himself, and tools for the party. Tools commonly include shovels, axes, a 5-gallon hand pump equipped with shoulder straps, water pails, and perhaps an extra supply of water in 10-gallon cans.

Where roads are good, or a larger crew is required for initial attack, 1½-ton trucks are used. These trucks carry 5 to 10 men, and tools for twice as many. They transport 100 gallons of water or more, a power pump and hose, saws for felling snags, a plow, food, mess equipment, and blankets. A type used in the national forests of the Lake States, and by the State of Minnesota, has compartments in both sides of the body, to separate such unmixable articles as axes, emergency rations, and gasoline. The trucks are customarily painted a bright red like city fire trucks.

# Speed of Attack All-Important

Speed of attack is all-important and good roads enable fire fighters to reach many fires while they are still small enough to be easily controlled. But motors afford power, as well as speed. Where water is plentiful motor-driven pumps often do work impossible for men with hand tools.

An especially promising unit for checking fires is the tractor and plow. Even in heavy going, where several men must clear out fallen trees to let the tractor through, this unit will still build control line faster and better than the same number of men could with mattocks and shovels.

Fire control is greatly facilitated by previously prepared fire breaks, cleared to mineral soil. Where such breaks are parallel to roads the discarded cigarettes of careless drivers fall where there is little or no inflammable vegetation. By using powerful tractors and graders the cost of building such fire breaks is reduced below that of work done with plow and disk.

These developments probably presage many others which will gradually be substituted for hand labor in the struggle for more adequate

fire control.

CROSBY A. HOAR, Forest Service.

LIES Aid Surgeons in Combating a Persistent Bone Disease of Man

The common blowflies have generally been regarded as pests, or at best only as scavengers. Recently, however, they were made to serve a useful pur-

pose when the late Wm. S. Baer, a noted bone surgeon connected with Johns Hopkins University, introduced the blowfly magget into surgery.

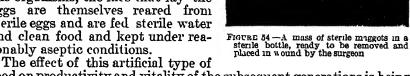
The story of how Doctor Baer began to use maggots in the treatment of osteomyelitis, a grave bone disease from which about 10,000 Americans are suffering, is exceedingly interesting. During the World War, Doctor Baer, who was a surgeon with the expeditionary forces, noted the condition of two soldiers who had been severely wounded and had lain on the battle field for nearly a week. The wounds of these soldiers were full of maggots, but when they were cleaned out the surgeons were impressed with the freedom of the wounds from infection. The men recovered with unexpected rapidity despite their long exposure and harrowing experiences. On the other hand, high mortality occurred among other men, suffering from similar wounds, who were promptly admitted to the hospital and given the best surgical treatment then known. About 10 years later Doctor Baer decided to try putting his findings into practice. Some cases were chosen which were not healing well after operation and a number of

common blowfly maggots were introduced. The results were very encouraging. Doctor Baer soon decided that he must make sure that the larvæ used in wounds were free from dangerous germs. He also found difficulty in having an abundant supply of larvæ available at all times, especially during the winter.

# Entomologists Aid in Producing Aseptic Maggots

The suggestions of entomologists were of value in the early developments, and later a number of entomological problems were undertaken

by the Bureau of Entomology in cooperation with Docter Baer, his associate Miss E. Knight, and other surgeons who had adopted this method of treating osteomyelitis. As a result of this work a very satisfactory method has been developed for producing maggots that are free from disease organisms. This method involves soaking the fly eggs in a disinfectant which will kill the germs but will not prevent the normal hatching of the eggs. The larvæ are reared on sterile food in sterile containers. The food chosen is not very nutritious and therefore keeps the larvæ healthy without causing them to grow much. In this way they may be kept for several days and then, while still small, be transferred to a wound. (Fig. 54.) In the meantime, to determine whether any germs have escaped the sterilizing process, a culture is made from each lot of larvæ and any lot which shows contamination is discarded and therefore never reaches the surgeon. As an additional safeguard against dangerous organisms, the flies that lay the eggs are themselves reared from sterile eggs and are fed sterile water and clean food and kept under reasonably aseptic conditions.



food on productivity and vitality of the subsequent generations is being studied. Investigations are also being conducted to determine what foods are best for the larvæ, the sunshine requirements of the flies, and the conditions of temperature and moisture which give best results. In this work, quite contrary to usual desires with reference to insect pests, high productivity and maximum vitality are sought.

Another problem with which the entomologist, as well as the sur-

Another problem with which the entomologist, as well as the surgeon, is concerned, is the manner in which the beneficial results are brought about by the maggets. The present indications are that the maggets not only eat away the dead and diseased tissue, leaving the healthy tissue, but also in some way check the multiplication of the

disease germs in the tissues and permit normal healing. To aid in clearing up this problem a more complete knowledge of the physiology of the maggots is being obtained. It is barely possible that this information can be used in the production of a substance which can be applied to the wounds and that we can thus avoid introducing the live maggots.

The work thus far done indicates that any one of several species of our common blowflies may be used in the treatment of ostcomyelitis. Those most commonly employed now are the black blowfly and one of

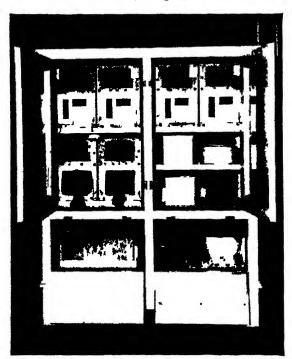


FIGURE 55—A type of cabinet used in rearing files and I was under controlled temperature and humidity. The doors are opened to show cages and containers. In the lower compartments the heat is supplied by electric-light bulbs at the right, the warmed air is circulated by means of the fan in the middle and is blown over the most cloths in a pan of water at the left.

the green-bottle flies, known scientifically as Phormia regina Meigen and Lucilia sericata Meigen, re-These spectively. species are sometimes pests of livestock, as they infest soiled wool on sheep. Just what species of blowfly will be most effective has not been determined, but the ease with which the green-bottlefly can be reared and handled makes it a favorite in most laboratories.

The facts that the larvæ of a certain species of blowfly, the screw-worm fly (Cochliomyia macellaria Fab.), is a destructive pest of livestock in the Southwest and that numerous cases are on record in which it has attacked man have led many people to

fear the maggot treatment of osteomyelitis. There is no danger of such destructive effects, however, if the screw-worm fly is carefully avoided.

For the production of larvæ for the surgeon, the flies are confined in cages in cabinets in which the temperature is kept fairly constant at about 80° F. and the humidity at about 50 per cent. (Fig. 55.) The air is circulated by means of a small fan. The flies are fed sterile sugar water and ripe banana, or a mixture of honey, yeast, egg, and water, although considerable range in diet is possible. At frequent intervals a small piece of clean lean beef is supplied and on this the flies lay their eggs. (Fig. 56.) These eggs are removed and treated with a disinfectant as described, if they are to be used by the surgeon. If they are to produce breeding stock they are put on a piece of meat and kept in a warm ventilated cabinet until mature. The maggots reach full

growth in about five days and crawl away from the food to pupate. The magget container is then put in a larger one containing sand or saw dust, and in this the larvæ pupate. The adult flies emerge in a bout

a week and are put in the gauze-covered cages for further use.

# Maggots Thoroughly Clean Out the Wound

In following Doctor Baer's method the surgeon performs an operation just as heretofore. A large incision is made, the dead and diseased bone is removed as thoroughly as possible, and a dressing is applied. A few days later, when bleeding has ceased, this dressing is removed and a number of maggots are



FIGURE 56 —Clusters of eggs laid on a piece of meat. The eggs are ready to be removed and sterihzed

introduced. (Fig. 57.) When these maggots become full grown they are washed out and, either immediately or a day later, another lot of maggots is put in This treatment is continued until the wound is



Figure 57—An open wound in upper leg, showing maggots feeding upon the dead bone deep in the wound. The inset is an enlarged portion of the wound and shows the maggots, about life size, closely packed together and feeding with heads downward. This is typical of their manner of feeding in deep wounds.

nearly healed. After the larvæ are introduced a cage with sponge-cork sides and a screen top is usually applied with adhesive tape to keep the larvæ from escaping. They must have air and not too much fluid in

the wound. This means that the wound must be kept open and the surplus discharge drained off. When the larvæ are first introduced the wound is swarming with germs, which, however, decrease rapidly in the presence of the maggots. The healing is accomplished usually in a few weeks, and the scars remaining are much less conspicuous than those caused by other methods of treatment.

Recurrences of osteomyelitis are ordinarily very common. Some patients suffer for years and many operations are necessary. The maggets, however, appear to clean out the wound so thoroughly as

largely to prevent recurrences.

Despite its repulsive features, the Baer method is being widely adopted. At the present time more than a score of hospitals in various

parts of the country are using it with satisfaction.

Although osteomyelitis is the only disease in which this treatment has been thoroughly tried, there are indications that it may serve a useful purpose in the treatment of other suppurating lesions in both man and animals and perhaps may benefit cases of tuberculosis of the bone, if complicated with other infections. When we think that thousands of patients are affected by osteomyelitis and that a large percentage of them are children, we must conclude that the blowfly is a real benefactor of man.

F. C. BISHOPP, Bureau of Entomology.

OOD and Drugs Act's
Requirements Apply to
U. S. Government's Buying

Few people think of Uncle Sam as a buyer of foods. It is true, however, that the Army, Navy, Veterans' Administration, and other branches

of the Federal service annually feed thousands of persons and spend millions of dollars for food. And it is essential to assure a clean, safe, and proper food supply and to obtain maximum value for the enormous expenditure of funds. To do this requires rare judgment and a background of fundamental knowledge of the various foods purchased—and their number is legion. Specifications must be drawn with great care so that the food purchased will be suited to its intended purpose, and the food delivered must be rigidly examined as to conformity to the specifications. The Department of Agriculture assists in this purchasing work, acting in an advisory capacity and inspecting samples. During the past fiscal year 4,426 samples of Government food supplies were examined in the Washington laboratories of the Food and Drug Administration.

### How the Government Selects its Food

Due to the fact that in the official family there is a diversity of class, occupation, and geographical location, it is necessary to provide different types and grades of food in order that they may be suited to the purpose for which they are intended. A prisoner, for example, will not get the same food as a disabled veteran. The essential qualifications and requirements are fully set forth in specifications drafted by a committee appointed for the purpose. Copies of the specifications are forwarded to brokers and manufacturers throughout the country and they are invited to submit bids and also samples of the products they propose to deliver in fulfillment of a possible contract. The samples are judged on the basis of the specification requirements, and the con-

tract is awarded to the lowest bidder whose product meets the-e re-

quirements.

The contract let and the supplies delivered, the question arises: Do the goods comply with the specifications and does the quality of the delivery measure up to that of the sample submitted? Practically all Government food specifications contain a clause to the effect that all deliveries shall conform to the provisions of the Federal food and drugs act. It is possible, of course, for a commodity to be in compliance with the law and yet be unsatisfactory for a certain purpose. This is due to a differentiation in quality of the foods above the legal requirements. For example, canned fruit is usually graded as fancy, choice, and standard, the last grade being the lowest. If the contractor furnished a grade lower than the specifications called for, a fraud would be perpetrated against the Government; but, if the fruit were

clean, wholesome, and properly labeled, no violation of the food and drugs act would

occur.

Often a simple inspection—or what the analyst terms an organoleptic test—is sufficient to decide the matter. Then, again, the product can be judged only after careful analyses by chemists and bacteriologists having all the facilities of modern, well-equipped labora-

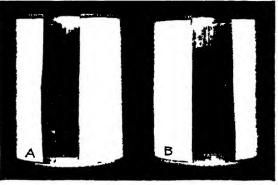


Fig. LEE 53 — 1. Minimum permissible fill, entire contents occupy but 90 per cent of the volume of the closed can: B, improperly filled can; entire contents fill less than 90 per cent of the volume of the closed can

tories at their disposal. Many such laboratories are located throughout the United States. Analyses of food supplies for the Veterans' Administration alone require the constant attention of a corps of trained chemists and bacteriologists. These supplies include practically every known food that comes in a can, besides such staples as flour and cereal foods, cocoa, coffee, gelatin, and dried fruits.

# Purpose and Value of Testing Foods

This brief article will make no attempt to enumerate all the tests made to ascertain whether or not the various commodities are in compliance with the specifications. There are a few requirements, however, which deserve special mention. For example, the Government insists that canned-goods containers be well filled with food, a requirement made by the food and drugs act. Foods are frequently adulterated with water. Water is a cheap adulterant, costs money to transport, and the law demands that its use be held to the minimum necessary for proper packing. So canned goods are carefully checked for the fill by the measuring of the head space, that is, the distance from the top of the can to the food level, and by draining the contents of the can on a screen of specific dimensions for a definite length of time. With price and quality approximately equal, it is obvious that a saving results to the Government only when well-filled containers are accepted.

Fat is the valuable constituent of cocoa. Cacao fat has food value and its monetary value far exceeds that of the other constituents of cocoa. Breakfast cocoa must contain not less than 22 per cent of fat, and department chemists see that this requirement is met. In many cereals and farinaceous products protein plays an important part, and here again the chemist assures himself that the protein content is what it should be.

As already said, the direct purpose of the testing of foods is to enable the Government to buy clean, wholesome food of the grade and quality desired, at reasonable prices. The effects of this work are, however, far-reaching, farmers and the food industries, as producers, being benefited. How is the farmer helped? The Federal food and drugs act, the power which motivates this work of testing Government food, requires a well-filled can. This necessitates the production of large quantities of raw materials, requiring a correspondingly greater demand upon the farmer for his products. The well-filled can increases buyer confidence, increasing the volume of business done in food commodities. And, while the general consumer gets no direct benefit from the efforts of the Government to protect food purchases for its own charges, he does derive benefit from the law under which all Federal food purchases are made. And that law is designed to improve the chances of all buyers of receiving what they expect to get for their money, namely, a well-filled can of wholesome food, honestly labeled.

Sumner C. Rowe, Food and Drug Administration.

OREIGN Countries Adopt
Variety of Subsidy Plans
for Agricultural Relief

Agrarian relief has been an important economic concern of many foreign governments during the decade since the war, but especially

since the beginning of the world crisis in 1929. Relief measures have been of two general types. One type has sought to lower production and marketing costs. Improvement of credit facilities, tax relief measures, reduction of transportation rates, provision of better storage facilities, etc., are illustrations of this type. The other type has sought to increase the gross income of the farmers by increasing the prices of farm products. On the whole this latter type has been distinctly the more important, and in this category measures regulating internal and external trade have been of outstanding significance. In the present brief survey, attention will therefore be confined mainly to these latter measures.

# Import Restrictions

During the last few years there has been a striking increase in the number and variety of import restrictions designed to increase prices in the home market for the benefit of domestic producers. These have included not only increases in tariff duties but also the employment of more direct forms of restrictions, such as import contingents, government licensing systems, and milling quotas. The system of milling quotas, which involves the establishment by law of stipulated minimum percentages of home-grown grain that must be used in domestic milling, has come into particular prominence during the last year or two.

What has happened with reterence to wheat affords perhaps the best illustration of the rise of import barriers. Since January, 1930, the tariff rate on wheat in Germany has risen from 42 cents to \$1.62 a bushel; in Italy, from 74 cents to \$1.07; in France, from 53 to 85 cents; in Austria, from 11 to 55 cents; in Greece, from 40 to 55 cents a bushel, and so on. But these additional duties tell only part of the story. German, French, and Italian millers are required by new milling regulations to use chiefly domestic wheat in their flour, so that the actual tariffs imposed on such wheat as is permitted to enter assume a secondary importance. Other countries, namely, the Netherlands, Sweden, Czechoslovakia, Greece, Estonia, Latvia, Peru, and Luxemburg have been employing this same device. More recently the British Government has announced its intention of establishing such a quota for homegrown wheat.

The only countries which do not impose duties on wheat are Great Britain, the Irish Free State, Denmark, the Netherlands, Norway, and Belgium, and the last three of these impose other import restrictions designed to achieve the same ends. In a number of the importing countries, such as Sweden, Norway, Switzerland, Spain, South Africa, Estonia, and Latvia, there is direct price-fixing and rigid governmental control of imports in support thereof. There have been temporary relaxations of import restrictions when domestic supplies were near exhaustion; but in general these toreign governments have assured their domestic producers a greatly preferred position in the home markets.

## Wheat Restrictions Typify the Trend

What has happened with reference to wheat typifies the trend for all agriculture. Immediately after the war there was a brief period during which the severe war-time restrictions on trade in agricultural products in Europe were somewhat abated and this was followed by a period of increased protection. Until 1929, this protection had for the most part taken the form of tariff increases which did not raise agricultural tariff levels much above those that had prevailed prior to the war. Since the collapse of world prices in 1929, however, the restrictions on imports have rapidly tightened. In Germany, the duties on cereals, meats, and other farm products have been increased several times. In France, Italy, Switzerland, Spain, Portugal, Chile, Mexico, Cuba, Canada, and in many other countries, there have been more or less comprehensive upward revisions of the duties on agricultural products, and in many of these countries other forms of restriction as well have been applied. Even Great Britain has imposed new restrictions on imports of foodstuffs and has announced her intention of extending them further.

# Aids to Exporting Industries

A great variety of measures has been employed to place the agriculture of exporting countries on a more profitable basis. Some of these, such as the international sugar agreement, have been designed to limit world exports and thus to raise the entire level of world prices. Even more directly restrictive, but applying to only a single country, is the Egyptian Government's limitation of cotton acreage. Under recent decrees, the area planted to cotton in the region where Sakellaridis is grown has been restricted to 30 per cent of the total area of land held by any one person. Outside this zone, acreage planted to cotton

is limited to 25 per cent of the total area in the possession of the cultivator.

Most of the government-aid measures in exporting countries, however, have tended to increase exports rather than to diminish them, while at the same time maintaining domestic prices on an artificial level. Most of these measures have tended to promote export-dumping and thus to lower world price levels in the course of the effort to isolate the domestic from the world market. Export bounties and premiums, import-certificate systems (which are, in effect, a type of export bounty), government trading and export monopolies serving as agencies through which the domestic output is segregated for domestic and foreign sale at different price levels—these and other measures have been resorted to in the hope of alleviating distress among producers of crops of which there is an exportable surplus.

### Various Export-Dumping Devices

There is a variety of devices the effect of which is to encourage export-dumping at the expense of either domestic consumers, taxpayers, or both. In detail, these measures differ considerably; but essentially this is the effect of all. One group of illustrations is to be found in the measures taken by the Danubian states in aid of their wheat growers. In Hungary, at the beginning of the crop year 1930, a decree went into effect granting to the producers of wheat a taxcredit coupon valued at 14 cents per bushel, of which any portion left after payment of tax arrears was paid in cash to the grower. This device was continued in the crop year 1931-32. An added provision has gone into effect, however, whereby the growers receive a net credit of 29 cents a bushel, half of which consists of the 14-cent tax-credit coupon carried over from the earlier law, the other half being immediately payable in cash. The funds out of which this bonus to the growers is paid are derived from the sale of "purchasing permits" to dealers in wheat at the rate of 48 cents for each bushel purchased. The difference between this sum and the 29 cents credit to the growers goes for refunding to exporters the sums which they have had to pay out for these permits and for an additional premium to them of 16 cents a bushel on their exports. The export business is conducted through an organization which is, in effect, a quasi-governmental monopoly.

In Yugoslavia, the Government exercises complete monopoly over the commercial wheat crop of the country and regulates internal and external trade in such manner as to maintain internal prices above the world level while selling the exportable surplus abroad for whatever it will bring. The Yugoslavian Government has been paying growers a fixed price, ranging according to grade, of from 77 to 84 cents a bushel in 1931–32, while selling wheat abroad for little more than half these prices. In Bulgaria a system is in effect whereby growers receive directly from the Government a guaranteed price of 67 cents a bushel, 70 per cent of which is payable in cash, the remainder in taxation bonds offerable against tax arrears. In Bulgaria, as in Hungary and Yugoslavia, the grain-control system is handled through a central purchasing and exporting organization. In Rumania, the

Government pays an export premium of 16.1 cents a bushel.

## Treaties to Facilitate Exporting

To facilitate exports the Danubian countries have been negotiating treaties with other European countries designed to secure for Danubian cereals and some other products preferential entry into the markets of these other countries. Some of these treaties provide for reduction of duties on definite quotas of stipulated amounts; others are less definite.

Other instances of export aid may be cited. Poland pays an export premium of 18 cents a bushel on wheat and also premiums on rye and barley exports. In Canada the Government is paying in 1931-32 a direct bonus of 5 cents a bushel (equivalent, at current exchange as of December 31, 1931, to 4.2 cents) to wheat growers in the prairie Provinces. More recently, the Australian Government has adopted a bounty of 4½ pence per bushel (9.12 cents at par and 5.08 cents at current exchange as of December 31, 1931) for this year's wheat crop. South Africa and Southern Rhodesia have established Government controls over the corn-export trade for the purpose of raising domestic prices above the world level. The principles involved are essentially the same as those employed to this end in Yugoslavia and Hungary The Government so controls the corn trade as in respect to wheat. to enable it to segregate supplies for sale in the domestic and foreign markets and to maintain domestic prices above the world level while selling the exported portion abroad at whatever price it will bring.

LYNN RAMSAY EDMINSTER,
Bureau of Agricultural Economics.

OREST Administration
Must Correlate Grazing
and Recreation Needs

Forest officers responsible for range management and recreation in the national forests are often confronted with the problem of the proper correla-

tion of two forms of conflicting land use—recreation and grazing. In establishing national forests to assure a permanent supply of timber and the protection of valuable watersheds, large areas supporting forage growth, formerly used by livestock, were unavoidably included. The old plan of first come first served, without regard to numbers of livestock or season of use, had resulted in range deterioration and serious erosion. Fundamental principles of range management were immediately put into effect by the Forest Service, and now on all important grazing forests, management plans provide for classifying each range and allotting to it the class of livestock to which it is best suited, regulating the period of use to plant growth requirements, limiting the number of livestock grazed, and giving due consideration to the needs of game animals and other national-forest resources.

The national forests have also been used for a long time for recreation. This use, comparatively small in the beginning, has increased by leaps and bounds throughout practically all of the national-forest regions. In California only a few thousand people used the forests for recreation 25 years ago; now more than 16,000,000 people visit them annually and some 3,000,000 make considerable use of them. This use includes nearly 6,000 municipal camps, auto camps, airplane landing fields, and many other recreational developments, and recreation

management plans have been developed for each national forest in California.

In developing these plans, correlation with grazing and other uses of national forest lands was necessary. Intensive recreational development and use was confined to the most desirable and accessible areas, while grazing was restricted to more remote areas. Where the class of livestock grazed was in conflict with recreation, a change in the kind of livestock was made.

#### Aids to Travel Off Beaten Paths

Forage is reserved at suitable and convenient places to facilitate travel with pack and saddle horse off the beaten paths. This is accomplished by the establishment of small pastures along regular routes of travel, placing of short stretches of fence across canyons connecting with natural barriers, recognition of packers engaged in transporting tourists and supplies, and the issuance to commercial packers of permits covering pack and saddle animals.

Under this arrangement thousands of people travel about the national forests annually and enjoy fishing, hunting, recreation, and the

scenic beauties of these mountains.

Closely related to grazing and recreation is the wild-life problem. No single use of national forests has greater recreational value and such possibilities for conflict with grazing as the use of ranges by game animals. This is especially true in California because of the variety and number of deer. To provide these animals with adequate food, domestic stock is reduced in numbers on large areas or excluded altogether. More than 2,000,000 acres of national-forest lands in California are given special grazing supervision for this purpose.

With well-developed recreation and wild-life management plans, the use of the national forests in California is increasing rapidly, while the use of the ranges for the grazing of domestic livestock is being main-

tained.

J. W. Nelson, Forest Service.

OREST-FIRE Protection by Cooperative Agreement Under the Clarke-McNary Law Cooperative forest-fire protection, in which the Federal Government shares under section 2 of the Clarke-McNarv

law, contemplates adequate protection of the 417,051,000 acres of private and State forest land outside of the national forests. Forty States, from southern California with its valuable watersheds to Oregon with its immense Douglas fir areas, from Maine's spruce lands to Florida's young pine, have forest land requiring protection, and no one system would fit the different conditions found in these various regions. Responsibility for supervising the cooperative fire-protection work lies with the States, although the work is inspected and the accounts are examined by Federal inspectors.

Organization, financing, and technic of fire control are, as far as possible, fitted to the conditions of each particular State. The generally accepted principle is that private landowners should pay one-half the cost of protecting their forest land, the other half being shared equally by the State and Federal Governments. A few States have

laws requiring landowners to pay their share; other States depend upon voluntary contributions. In some States, however, the owners are carrying a larger burden than are the State and Federal Governments.

It is generally impracticable to obtain material financial cooperation from owners where forest land is held in small tracts, and public agencies usually assume full responsibility. Financial cooperation from the counties is common in the Eastern States. Under any plan of financing much valuable cooperation is obtained from landowners without cash outlay.

#### Owners' Protective Associations

In some regions where the land is held in large tracts and the owners have a keen appreciation of the value of the timber and the damage done by fire, owners commonly organize forest-fire protective associations, under the leadership of the States. Assessments to provide funds for use by these associations may be voluntary or required by State law, and the associations customarily manage their own fire-control organizations under a plan mutually acceptable to the association and the State. The work is inspected by the State and the association receives financial aid from the State and Federal Governments.

The West Virginia State law provides that unless the forest-land owner gives satisfactory protection to his land the State may collect 1 cent an acre from him for protection supplied by the State. But because of lack of funds to administer this law, it has not been given State-wide application. However, two large associations covering nearly 2,000,000 acres were formed several years ago. Each member pays into the association 1 cent for each acre of forest land owned by him within the association area. The State obligates itself to pay an equal amount from State and Federal funds. In addition, the counties are required by law to pay the cost of temporary labor and supplies used in fighting fire, when such costs are authorized and the accounts verified by State officers.

# Managers are State Employees

The field managers of the associations are employees of the State, which pays most of their salaries. Semiannually each field manager reports on the work and submits a working plan and budget for the next half year, which must be acceptable to the State forester and to the association. Direction of the work is left to the field manager, or district forester, as he is usually called. He must see that lookout towers, telephone lines, and fire tools are in good condition before the opening of the fire season. (West Virginia has a fall fire season in October and November, and a spring fire season in April and May.) He directs and carries on an educational campaign for fire prevention. He observes weather conditions; employs lookouts, rangers, and wardens, and places them somewhat in advance of dangerous fire weather. During bad fire weather he keeps in close contact with the organization, and is alert for critical situations which require shifting of man power or expert direction to prevent large fires with heavy suppression costs.

OREST-FIRE Protection Involves Detailed Planning of Transportation System The time elapsing between the start of a forest fire and the arrival of fire fighters may mean the difference between quick suppression and a dis-

astrous conflagration. Consequently, the Forest Service, in planning for fire protection in the national forests, must determine for each area the necessary "hour-control," or the maximum time that a fire can safely be allowed to burn in a given fuel type under "average bad" conditions before the first suppression forces arrive. A portion of the hour-control interval is needed for discovering and reporting the fire and for get-away. What remains is available for the firemen traveling to the fire. Hour-control time is determined by the value of resources, the degree of inflammability, and consequent rapidity of action deemed necessary to hold losses below a specified limit.

The objective of the transportation planning is the design of a transportation system, together with the placement plan for protection personnel, which at the least annual cost per unit of area will enable

fire fighters to reach any fire within the allowable travel time.

Planning on the basis of reaching an entire area within the prescribed travel time will usually result in a large overlapping in coverage from various protective positions. Also certain relatively small portions can be brought within the allowable travel time only at excessive cost. As a result of balancing costs against benefits, it may be decided in such cases that the instructions for the planning should provide (1) that some definite percentage of the total area shall be within the prescribed travel time, (2) that the area of any unreached block shall not exceed a stated size, and (3) that practically all points in such a block shall be within a different but greater travel time.

## Several Layouts May Be Necessary

The desired coverage can usually be secured with several different layouts of transportation facilities and men. Obtaining the best possible combination of men, roads, and trails would be well-nigh hopeless if the cost per square mile and the most efficient distance between firemen had not been ascertained for various combinations of speed of roads, trails, and cross-country travel, allowable travel times, and annual costs for firemen, roads, and trails. The layout upon which the data are based can seldom be completely attained. The data are used as a guide to determine the nearest possible approach to the assumed system in which project costs average those on the ground.

The specifications for building the transportation plan cover the allowable travel time, both first-line and second-line defense, for each

fuel type or zone of inflammability within the area.

First-line defense ordinarily consists of one man available to be sent to a fire at any time. More men are used where conditions call for them. Second-line defense bases are those where fully equipped crews of not less than the minimum size required for second-line purposes can be obtained. In the design, speed ratings, and cost estimates, first-line men on or near roads are considered as equipped with light automobiles. For second-line forces, the 1½-ton capacity truck is ordinarily the standard.

The next step in planning the transportation system is to secure field information and data. For each existing road and trail the man making the plan must know the location, speed standard during the fire

season, the cost to raise this standard, and the annual maintenance cost. Similar data are needed on all proposed and possible routes for roads and trails within reasonable cost. Comparable information is needed for water routes. Knowing the present efficiency of the existing system for first and second line defense it is now necessary to develop a planned system satisfying the specifications.

## Area that Can be Covered is Mapped

Starting with the first fireman, and using the proper speed for each existing travel route, the area which he can reach within the prescribed travel time is worked out. For instance, if two hours are allowed, and the fireman is located on a road with a speed standard of 15 miles within an hour, he can travel 30 miles in each direction within the allowed time. With a cross-country foot-travel speed of 2 miles he can go out 4 miles on each side of the road opposite his station, 3 miles from a point on the road 7½ miles away from his station, etc.

The area covered by each existing fireman within the allowable time limits is indicated on a map. The next step is a similar mapping of second-line coverage. Every combination of existing routes is utilized.

A computation of the annual cost of the present system is then made. This is based upon the area within the specified travel time for first line defense. For roads and trails, the costs include the annual maintenance charges necessary for protection use plus a percentage of the construction investment required to build to the standard necessary for protection. For firemen, the costs include such portion of wages, including subsistence, as are chargeable to protection. For improvements at firemen's stations, the amount is such portion of the annual depreciation plus annual maintenance as is chargeable to first-line defense.

The planning work so far done has shown to what extent the present transportation system and protective organization fulfill the requirements. The probability is that there will be a great duplication in coverage in certain sections while other sections will be far beyond the travel allowance. Cases of 100 per cent duplication will be infrequent but the maps will show many instances where the coverage can be improved by changing the location of firemen or by raising the speed standard of existing roads.

## Means of Improving the System

The next step is to find the best means of improving the system so that it will satisfy the specifications. Maps and transparent overlays are used in working out the best combinations. All possible and proposed routes of travel which seem practicable from a cost standpoint are determined. Men are shifted where insufficient or duplicate coverage dictates such procedure. New positions are introduced where needed. Existing routes are altered in speed if necessary or abandoned if found of negligible value. Possible new routes are utilized when required and assigned the speeds found most economical. The final result should be a coverage for the first-line defense of not less than the minimum percentage specified as acceptable, and a transportation system approximating as closely as practicable in ground plan and speeds the objectives sought.

Starting from the second-line supply points, second-line coverage is worked out by the same methods. It is extremely unlikely that the crew coverage will be satisfactory upon first trial. If it is, the system satisfies the specifications for both first-line and second-line defense. If not, changes must be made to secure the required second-line coverage. The changes will usually be a substitution of roads for trails and an increase in length or speed of planned roads.

It is now necessary to coordinate the first and second line defense plans. Through balancing back and forth between first and second line overlays, the final system is determined. Unit costs are computed

in the same manner as for the existing system.

Variations in the method of planning may prove advisable because of unusual conditions. In certain cases, the use of air transport to supplement ground travel may be practicable.

#### The Final Check

The final check of the plan is made in the field and covers the feasibility of planned routes, correctness of cost estimates, practicability of securing planned speeds at estimated costs, suitability of construction standards, and correlation of planned locations with routes needed for

utilization of the forest resources and other purposes.

Effectiveness in expenditure requires close correlation between the transportation plan and the fire detection plan. While both plans could be made independent of each other, there is the possibility of so locating some men that they may serve both for detection and for suppression. When the two plans have been worked out, it appears that it will be relatively easy to determine the communication system that at least annual expense will render adequate service for protection as well as for administration.

T. W. Norcross, Forest Service.

OREST Fires Are
Often Fought With
Water in California

The shovel and ax have always been the standard forest-fire-fighting tools in California. Other tools have been adapted or invented for removing inflammable material

from advancing fire, the method being to construct a fire line or trail and enable fire fighters either to stop the fire directly or afford them

a place from which to back-fire.

Water was never, until recent years, considered a practicable means of controlling forest fires, largely because it was scarce in regions of fire hazard. In the earliest days of the Forest Service, however, water was used, usually in "mopping-up" a fire. Thus originated the 5-gallon orchard spray pumps. They were heavy, however, and difficult to

carry, and were but little used.

About five years ago the first back-pack pump outfit was adopted for fighting forest fires. Now a very essential part of fire-fighting equipment, the outfit consists of a 5-gallon galvanized-iron water can carried on the fire fighter's back. A hand force pump is connected to the can by a short length of hose, and various types of nozzles are used. The outfits are very efficient in extinguishing grass fires and subduing hot brush or reproduction fires so that men following the pump operator can work with axes, shovels, and other tools. After a fire has been stopped and a fire line constructed around it, these pumps extinguish burning material.

### Portable Power Pumps

The use of back-pack pumps indicated the value of water judiciously used; the great need was to obtain more water. Many different types of portable power pumps have been developed, most of which can be carried by one or two men. Capacities vary, but pumps delivering 35 to 40 gallons per minute at 135 pounds pressure through %-inch nozzle openings are very effective. One thousand to fifteen hundred feet of 1%-inch hose in 50-foot lengths are carried with each unit. A truck transports the unit as far as possible and it is carried by pack horse or man power to water near the fire. Although a large number of forest fires in California are beyond reach of water even with a pump and 1,000 feet of hose, such a portable pump is often needed, and each fire truck carries one.

The next step is the tank truck, practical use of which depends entirely upon road development. (Fig. 59.) During the last five years

road construction within California's national forests has made many hazardous areas accessible to the motor truck, but on many such areas it is not yet feasible to use tank trucks. For this reason and because of lack of finances, the Forest Service has lagged behind the State and some county fire-



FIGURE 59 — Fire track wishing out ' fire along Pacific Highway. Shasta Nation II Forest

fighting organizations in the use of tank trucks. These agencies protect areas of denser population at lower elevations, where road

systems are much more complete.

The most efficient use of tank trucks demands numerous sources of water. On many hazardous areas water is scarce, and it must be collected in tanks or reservoirs from small streams and springs wherever practicable. Such storage development is expensive, but through the cooperation of another Government bureau the Forest Service has obtained 75 redwood tanks varying in capacity from 300 to 15,000 gallons.

### Equipment of Tank Trucks

The tank trucks in use vary in capacity from 250 to 400 gallons, are equipped with either rotary or centrifugal pumps, and are usually driven by power take-offs on the transmission. They should at least be capable of delivering an effective stream of water through 1,000 feet of 1½-inch hose, with the point of delivery up to 200 feet above the truck. Suction hose is provided by means of which water can be drafted from streams. A thousand feet of 1½-inch hose is carried in 50-foot lengths and there may be additional amounts of ¾-inch or 1-inch hose on reels. Through Siamese connections several different streams of water can be directed from the same truck simultaneously. Shovels, axes, etc., and 10 to 12 water back-pack outfits ready for instant use, are auxiliary equipment.

The immediate needs are speedy transportation through the construction of adequate road systems and consequent use of more powerful trucks, development of all needed sources of water supply, and the training of personnel in speedy and efficient use of water.

WALTER E. JOTTER, Forest Service.

OREST Management of Cut-Over Land Aims at Uniform Yield Annually Ponderosa pine stands in Arizona and New Mexico contain trees of all ages from seedlings to old timber ripe for harvesting. In harvesting national-

forest timber young, fast-growing trees and sufficient healthy well-formed larger trees are reserved to insure a new crop on the cut-over area. The number of trees reserved depends on the amount and condition of the original stand, and while the stand consists of various ages the volume of timber in each age class will vary on different areas. Abundance of young growth shortens the time for establishing the new crop. In the absence of reproduction four seed trees over 20 inches in diameter  $4\frac{1}{2}$  feet from the ground are reserved on each acre. Young timber and seed trees grow more rapidly after the area is cutover. When the cut-over area again bears enough timber to make cutting profitable another crop can be harvested.

In managing national-forest timber it is essential that the annual yields of timber be approximately equal. The virgin timber should be made to last until the new crop on the cut-over land is ready for cutting. Growing timber is a long-time undertaking and it is necessary to find out how rapidly the timber left on cut-over land is growing. It is the policy to determine the volume of timber left on the cut-over areas as soon as cutting is done, and later at intervals of from 10 to 20 years. The difference in volume indicates the total growth, and these data are used to determine how rapidly the old timber can be cut to insure a sustained timber business.

In 1907 a section of timber, near the edge of the timber type, on the Coconino National Forest, Ariz., was cut over. The site was dry and the original stand of timber light. There was cut from the section 2,208,000 board feet and a stand of 840,000 feet was reserved. In 1930, the volume of timber was found to be 1,390,120 board feet, a growth of 550,120 feet, or 23,918 feet per year. In view of the light stand reserved and the rather difficult site conditions, the growth is considered excellent. Better stands of timber on better sites show annual growths of 75 to 100 feet per acre of cut-over sale area. The reserved stand plus the growth will make profitable cutting in from 50 to 75 years, and shows the advantage of reserving young timber and seed trees when cutting timberland in the Southwest.

QUINCY RANDLES, Forest Service.

OREST Resources Can
Be Wisely Used Without
Hampering Recreation

Are those who use the national forests for recreation aware of the need for proper forest management which recreational use entails? A group of trees,

a green mountainside, a good supply of game, all furnish refreshment and diversion. Consequently, people who love the outdoors, and who frequent the mountains and forests, want resources conserved. So ardent do they become sometimes that they insist on no cutting of

timber, no grazing, and no hunting whatsoever.

But while seeking to preserve, they may easily set up conditions that will have an entirely opposite effect. What happens if man never cuts any trees? Often 30 or more seedlings start to a square foot, or over 100,000 to the acre. Competition for light, moisture, and soil nourishment is very severe and obviously many trees must die and be wasted before others can get room enough to reach large size. Eventually, old age, fungi, insects, or fire will destroy the remainder. This sort of protection has little in its favor. On the other hand, if man had harvested and used the surplus and mature trees before they rotted, the remaining trees would have grown faster. Harvesting need not mar the beauty of the landscape.

Denuded mountainsides, polluted water, and camp grounds frequently damaged by livestock have aroused the ire of nature lovers, but millions of acres in the West produce valuable forage that in many instances can be utilized without harm to recreational or aesthetic values. Livestock even contribute to these values. Bands of well-managed sheep grazing peacefully on the slopes add life to mountain scenery, and grazing cattle often draw attention to beautiful mountain

meadows.

### Even Game Must Be Thinned

Ruthless destruction of big game has brought about the closing of large areas to hunting. But even this sort of protection has its dangers. Game must eat. Their range can not be overstocked without damage. Regulated use of the surplus game is absolutely essential. Otherwise the herds will suffer from shortage of food, reduction in the rate of increase, and disease.

People seeking recreation in the forests get their diversion and refreshment by activities that stimulate both mind and body. Real physical recreation comes as the result of effort, and there is a real

stimulus in the study of flowers, trees, rocks, and animals.

A scientific interest in making trees grow better and faster and an understanding of the difference between wise use and useless waste brings an added pleasure in forest recreation. With the increase in population and the growing concentration of people in cities, the desire and need for mountain playgrounds increase. The number of visitors to the national forests has jumped 1,000 per cent since 1917. More and more people are learning the value of outdoor recreation and feeling the need for it. But their recreational tastes can and should be developed to appreciate those arts which not only preserve, but produce more beauty, those arts which intelligently harvest forest crops that would otherwise be wasted.

Dana Parkinson, Forest Service.

Complicated Job on the Eastern National Forests

Within many of the eastern and southern national forests, cutting and disastrous fires have taken all the virgin timber on large areas and left

the land almost totally devoid of merchantable growth. In many cases, repeated fires have destroyed seed trees and reproduction, and seriously lowered the productive capacity of the soil. Forest weeds,

such as pin cherry, hercules club, sassafras, and scrub oak, frequently cover such areas, and briars, annual weeds, grasses, ferns, and mosses are often abundant. Natural reforestation of the area by valuable timber species decreases because of the lack of seed trees and the unsuitable seed bed, while the undesirable cover increases.

Where such areas exist, careful planting surveys must be made to determine the amount of planting stock of suitable species and age classes that must be produced in the nursery for reforestation purposes. The chief forest nursery in the eastern region is located at Parsons, W. Va., on the Monongahela National Forest. It has an authorized capacity of 3,000,000 trees annually, largely red spruce transplants. (Fig. 60.)



Figure 60 - The Paisons nuisery, Monongahela National Foiest, W. Va

At Russellville, Ark., the Ozark nursery is operated on a basis of 1,000,000 shortleaf pine seedlings annually. Small experimental nurseries are located on the Ocala and Choctawhatchee National Forests in Florida.

Any reforestation program demands an adequate supply of seed. Many tree species grow over a wide geographic range, and it has been proven that seed from the southern portion of the range of a certain species is not suited to the production of planting stock for use in a decidedly more severe climate. It is essential, therefore, that seed be collected from thrifty trees in a location climatically similar to the area on which the young trees are to be planted.

# The Handling of Planting Stock

Planting stock must be lifted just prior to the planting season, sorted, counted, bundled, packed, and shipped by train or truck to the planting site. Here it is heeled in until planted. Most of the planting

on eastern national forests is done in the early spring, although in the southern pine region, the planting season is from December to February. Planting camps are usually organized with sleeping quarters, mess tents, and tools. Planters are hired locally—farm or woods labor being preferred. Crews of from 10 to 14 men are used, each crew in charge of a trained foreman. On the more northern forests, such as the Monongahela and Allegheny, the square-hole method of planting is used. The hole is dug with a mattock or special planting hoe, the tree is set in the center of the hole, and the earth firmly tamped around it.

Conditions on the Monongahela, in West Virginia, are similar to those on the Allegheny National Forest in Pennsylvania. (Fig. 61.) The brush, if not too dense, provides some protection for the planted trees, and does not greatly hinder the work of planting. The ground cover, however, and especially the mass of roots in the top layer of soil, makes planting more difficult, and lessens the moisture available for the

planted trees. Well-developed planting stock carefully planted is essential in securing good survival. Norway pine and Norway spruce have given the most promising results so far on the Allegheny, while red spruce is best suited to the Monongahela.

On the Ozark National Forest in Arkansas, the areas to be planted



FIGURE 61.—Crew at work on a typical area in need of planting, Allegheny National Forest, Pa.

are old fields, most of which are no longer suited to cultivation. Short-leaf pine seedlings are planted on these areas in order to enable them to produce once more the crop for which they are best suited—timber.

In Florida, on the Choctawhatchee and Ocala National Forests, the problem is to plant longleaf pine on dry, sterile, sandy soils, devastated by repeated fires. The fire hazard is high, and scrubby oaks and other brush offer serious competition.

Experimentation to develop an effective technic prior to extensive reforestation is now under way on both the Choctawhatchee and Ocala.

With a tap-rooted species, such as longleaf or slash pine, the slit method of planting is satisfactory and economical. A vertical slit is made in the soil with a planting bar and the roots of the seedling are inserted in the slit, which is then closed by pressing the earth firmly against the roots with the planting bar and the heel.

Fire is the most serious enemy of planted forests. Plantations must be protected by firebreaks, roads, and trails, and during dangerous

periods by lookouts and supplementary patrol.

Severe drought causes losses in plantations. Weak trees and those poorly planted are less able to survive extreme conditions than thrifty

trees carefully planted. Rabbits, porcupines, insects, and diseases may also become destructive to plantations.

On the Allegheny National Forest deer cause considerable injury by browsing the young trees. Areas which show evidence of intensive use

by deer should not be planted.

White pine is not being planted extensively on eastern national forests because of the prevalence of the white pine weevel and the whitepine blister rust. This species is being used, however, to a limited extent on the Shenandoah, Natural Bridge, Unaka, and Pisgah National Forests. On the Shenandoah, wild currants and gooseberries (Ribes spp.), alternate hosts for the blister rust, occur and a definite program of eradication is under way. The disease, however, has not yet been found south of Pennsylvania. South of the Shenandoah there is little danger of infection of pine stands.

Artificial reforestation on the eastern national forests is by no means a simple task; it is complicated and arduous. Saw timber, pulpwood, and other forest products from acres now idle, and the regulation of

stream flow will, however, justify the effort and cost.

L. S. Gross, Folist Service.

Torrestry Is an Aid to the Farmer in Controlling Erosion

Controlling Erosion

Controlling Erosion

Erosion

Controlling Erosion

Erosion

Controlling Erosion

Erosion

Soil is the farmer's greatest asset, and the prosperity of any nation is dependent upon this basic element. American farmers have had so much good farm land that its abundance has often led to careless use or even to complete destruction of this most valuable resource. Erosion or soil washing



Figure 62 — 1 his steep hill land should have feen kept in woodland. After a few years of careless and unprofitable cultivation it has been abandoned. The old corn lows lunning up and down hill are rapidly becoming a maze of gullies.

has probably ruined more good farm land than any other single factor. (Fig. 62.)

Threatened loss of his farm by financial disaster would stir the owner to action, but gradual loss by erosion seldom worries him until

the damage has been done. Farm land is being lost gradually by erosion on cultivated hill lands throughout the country, especially where

soils wash easily and rains are heavy.

The farmer is often not aware that sheet erosion or surface washing is taking the fertile topsoil until crops begin to show its effect, and then he usually believes that the crops have exhausted the land. If sheet erosion is unchecked gullies develop, and the farm may eventually become a hopeless waste and productive land may in a few years become a liability. Soil erosion is responsible for the loss of many farms through indebtedness (Fig. 63)

Preventive measures such as terracing, use of cover crops, and deep cultivation may be very effective in checking erosion on slopes up to 10 or 15 per cent. On steeper slopes and on areas subject to severe



Fig. 187 63—With lack of foresight this farmer cut and burned young pine. He hoped this field would develop into a pasture but instead the area will soon be a guilled waste. The pines, if protected from fire, besides saving the land, would in a few years have produced a valuable crop of timber.

washing, or on land already in gullies, a stable vegetative cover is necessary. A good grass sod or covering of vines may be sufficient, but trees are one of the most effective means of preventing or controlling soil movement. If properly managed and protected from fire and excessive grazing a forest cover will also yield the farmer an income in the form of timber, posts, and fuel wood. Foresters are giving increasing attention to the part forestry plays in solving the farmers' soil erosion problem.

# Black Locust Widely Useful

Black locust is well adapted for controlling erosion over wide sections of the country. It grows rapidly and produces a vigorous, spreading root system that holds the soil in place. Furthermore, it is a legu-

minous plant which adds nitrogen to the soil. The wood is very hard

and durable, and of particular value for fence posts.

For nearly 20 years farmers in parts of the central hardwood belt have been reclaiming gullied land by planting black locust. In many instances this formerly waste land valued at \$1 or \$2 an acre has in 15 years yielded 500 to 1,000 fence posts per acre. At 20 cents a post this represents a gross income of \$100 to \$200 per acre, returns which compare favorably with profits from cultivated and pasture land.

Other trees may prove as successful as black locust in stopping erosion although this has not yet been thoroughly demonstrated. Several experiments are now under way, particularly in the seriously eroded hills in northern Mississippi, by the Southern Forest Experiment

Station.

Farmers can prevent much erosion if they will use caution in clearing slopes above 15 per cent. If the soil on steep slopes is left unprotected, erosion will usually render the land worthless for agricultural use within

a few years.

Two recommendations are made to upland farmers, particularly to those located in the silt loam uplands and bluff soils region: (1) Keep steep slopes in woodland, thereby protecting the soil from erosion and assuring a continuous supply of timber, posts, and fuel; and (2) on land that is starting to erode, or already in gullies, plant trees which will keep the area productive.

J. D. SINCLAIR, Forest Service.

ORESTRY Is Reclaiming Cut-Over Charcoal Lands in Southern Appalachians

In the foothills on both sides of the historically rich Shenandoah Valley, the ironmasters who operated the old iron furnaces unintentionally be-

gan an experiment in forest management over a century ago which now provides opportunities for the modern forester. (Fig. 64.) To produce the charcoal necessary in the smelting process, thousands of acres of timber were cut clean. Occasionally, the same area was cut

over two or three times.

These "coalings" came up to fine stands of second growth, but the ironmasters did not understand fire control. When a fire occurred large crews went out to fire around the area being cut, which spread instead of checked the fire. "Turning the red bull into the woods" was the usual habit of small farmers who had a few cattle to graze. Bark peelers operating in areas adjoining the old coalings invariably set fire to the forest just before the peeling season as an insurance against burned bark. When not fatal to the trees, these fires resulted

in scarred butts, retarded growth, and poorly formed trees.

As iron industries shifted to more profitable fields, the furnaces were closed down and the ironmasters sold their agricultural holdings, retaining only the more rugged, mountainous lands. In 1911 the Government started to acquire these lands, under authority of the Weeks law, and with their inclusion in the Shenandoah National Forest began the effort to repair the damage caused by repeated fires. In 1914, however, chestnut blight made its appearance, spreading south from Maryland. As chestnut comprised 20 to 60 per cent of the young stands, the importance of this disease is apparent. Control measures were soon found to be futile and steps were taken to salvage the chest-

nut. Fortunately, a ready market existed in stave mills manufacturing barrels for Virginia apple growers. Thousands of cords of stave wood, chiefly chestnut, were cut from the coalings, along with other species of low value for saw timber or special products. (Fig. 65.)

### Some Coalings Not Severely Burned

A few old coalings, however, escaped fire, or at least were not burned severely. The Mollies Hill area,

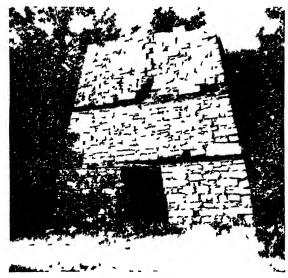


Fig. BE 64 —Rum of an old non furnice on the Shen indoah National Forest

Mollies Hill area, which supplied wood to the old Crack-Whip furnace on Trout Run, came into Government ownership supporting a fully stocked 100-year-old stand of mixed hardwoods in which white and chestnut oak predominated. Density of the stand had retarded growth. It was first thinned and the chestnut removed for telephone poles. Then a saw-timber sale took out the less desirable oaks and the defective individuals of all species. Finally, the tops and unmerchantable trees



In the 65—Stave-wood and fuel-wood siles have removed fire soured, defective, and weed trees from this young oak stand

were sold for fuel wood. The result is a thrifty, rapidly growing stand of valuable species which will be ready for another saw-timber

cutting in 25 to 30 years.

In stands too small for saw timber, stave-wood sales remove the larger chestnut and inferior species, and fuel-wood cuttings take out everything else except the trees selected for the final stand. The object is to leave the proper number of trees of the best species to produce the maximum amount of most valuable wood products in the shortest time. Already hundreds of acres of these fire-scarred young stands have been placed in satisfactory condition for rapid growth through sale of defective and weed species at a net profit.

R. M. EVANS. Forest Service.

Carry on Broad Program in the Central States

Forestry is a relatively new project in boys and girls' 4-H club work. Forestry clubs are organized in more than half of the 13 Central States,

with approximately 2,000 4-H club members enrolled. The project is carried on with the expectation that, through this phase of extension work, farm boys not only will come to have a better understanding of the forests and be led to recognize the existence of forestry problems, but that they will also learn how to conserve the present wooded areas and will become interested in providing forests for future use.

The practice and knowledge gained from satisfactorily completing this project do not, necessarily, make foresters of the boys, but do equip them with the ability to appreciate the forests, to know how to handle and protect the woodlands on their own farms, to participate in reforestation and forest-fire-prevention activities. and to assume their part in boys and girls' 4-H club work.

# Supervised by Extension Agents

The 4-H forestry clubs are supervised by the extension service in the State concerned with the Office of Cooperative Extension Work, United States Department of Agriculture, cooperating. The organization of forestry clubs is under the direction of the State club leader and the county extension agent. The subject-matter material for this project is prepared under the supervision of the State extension forester. The local club leader directs the activities of the boys who enroll in any given local club.

# Carry On a Variety of Activities

The 4-H forestry club boys engage in a wide variety of interesting activities. Among these are reforesting land areas on their own farms or on land obtained for this purpose, planting windbreaks or shelter belts about the farmstead, making improvement cuttings in the farm woodland, gathering tree seeds for their own use or for sale, and establishing private nurseries with the end in view of growing their own planting stock.

The great majority of 4-H forestry club members reforest a certain land area each year, looking toward the future ownership of a sizable piece of growing timber. In most of the States this accepted proce-

dure is supplemented by group activities in which the entire club

participates.

Forestry pageants are presented, exhibits are made at county and State fairs, demonstration teams are trained, hypsometers, calipers, and Biltmore sticks are made and used, fire lines are constructed when the size of the timbered area warrants, inspection trips are made to wood-utilization plants, and tree-identification hikes are taken. In certain States, the work of the older 4-H forestry club boys is recognized by the State authorities, who appoint them assistant State fire wardens.

Wisconsin leads in establishing school forests. The land, which usually is provided by some organization such as a lumbering company or a chamber of commerce, is deeded to the local school. Each year the club members reforest a definite area so that within a stated number of years the entire area will be covered with growing trees of different ages. Both Wisconsin and Michigan hold forestry-club camps where instruction is given by trained foresters, and where the boys

enjoy the experience of camping out.

Iowa conducts a farm grove history contest which provides a means whereby farm youths become familiar with the history of the woodland on their own farms. In Minnesota a civic forest is now being developed by a forestry club which instituted the plan with the assistance of the village authorities. In the mining section of Minnesota the boys sometimes utilize the ore dumps for their planting. Ohio boys who live in the coal-mining section often do their planting on the mine strips when other land is not obtainable.

Such slogans as "Plan to plant another tree," "Have boys and trees grow up together," and "Youth develops where youth builds" are

used in 4-H forestry club work.

R. A. TURNER, Extension Service.

RUIT and Nut Production
Depends Greatly on Amount
of Foliage the Trees Carry

The leaves of fruit and nut trees are essentially the factories in which the products that go to build the fruits or nuts are manu-

factured. Leaves are often spoken of as the lungs of the plant. While the leaves of plants do perform functions somewhat similar to those performed by lungs in animals, they do much more than this. They are really analogous to the digestive tract as well, for in the leaves the raw materials from the soil and from the air are built into the products that go into the fruit or nut and the woody tissues of the plant. These products, consisting of sugars, starches, acids, protein materials, and many other compounds, are either formed directly in the leaves or built in the fruit from the materials supplied by the leaves.

Thus it will be seen that the foliage of the plant is of tremendous importance from the standpoint of fruit and nut production. Within limits, the amount of fruit that a tree can carry through to maturity depends very largely upon the amount of foliage that it carries and whether or not conditions are right for the functioning of the foliage.

During recent years a great deal of work has been done to determine as accurately as possible the amount of foliage necessary to build certain fruits. With apples and pears, for example, it has been found that where only 10 well-developed leaves are present for each fruit on the tree, the fruit at the end of the season is smaller than the best commercial size, is generally poorly colored, and is likely to be poor in flavor. With 20 large leaves per fruit, apples and pears of fair commercial size are usually produced. With a crop of this size on the tree, however, the fruit uses for its development so nearly all of the materials formed in the leaves that most varieties are likely to produce a poor crop the year following. With 30 or 40 leaves per fruit present throughout the tree, fruit of better commercial size and better quality is obtained. Trees carrying this amount of foliage in proportion to the fruit crop are also in better condition to produce a crop the following year.

### Factors Affecting Leaf Area

The amount of foliage that a tree carries is largely determined by the amount of growth that the tree makes. In the deciduous fruits the leaves are all produced on new growth, on either spurs or shoots, and the amount of leaf area is directly proportional to the amount of growth made. Thus a spur on an apple tree which grows 1 inch per year will carry a larger number and a larger size of leaves than a spur making only one-quarter of an inch of growth per year. Similarly, the longer shoots carry more leaves than the shorter shoots. Consequently, the best way to obtain increased foliage in the trees is to stimulate the growth conditions.

After the leaves are formed it is necessary to protect them from insect pests and diseases to prevent their being eaten away or their premature dropping. Any condition that results in defoliation of the trees before the fruit ripens will result in fruit of small size, poor color, and poor quality being produced during the year that the defoliation occurs. Defoliation is also likely to be followed by a crop failure during the following year. Any decrease in the number of leaves is likely to result in a corresponding decrease in the function of the tree.

# Factors Affecting Leaf Function

Many factors influence the function of the leaves, but a few are of outstanding importance from the standpoint of the orchardist. Leaves function to build food supplies only when exposed to light. A reasonable amount of sunshine seems to be very desirable to obtain fruit of

best size and quality.

Of tremendous importance, from the standpoint of leaf function, is the moisture supply available to the tree. Under conditions of severe drought the leaves apparently function to only a very limited extent in building food materials; consequently, under these conditions the fruit ceases to grow. In the case of nuts, if the drought comes early, before the shell has hardened, the nuts are likely to be small. Shells of nuts usually harden in midsummer, so that the size of the nut is largely determined by conditions existing during the first half of the growing season. If a drought occurs late in the season nuts are likely to be almost normal in size, but will be poorly filled, owing to the absence of leaf function during the period when filling occurs.

There is some evidence that leaves that are well supplied with nitrogen and other essential elements from the soil, so that they are of rich green color, function more effectively than leaves of similar area that are poorly supplied with nitrogen or other essential elements.

A shortage of nitrogen in the tree also results in decreased growth and leaf area.

There is also evidence that leaf function is at least partially correlated with the amount of crop on the tree. With a heavy crop the leaves present will function slightly more efficiently than with a light crop; consequently the greatest total weight of fruit per tree is usually obtained when there is a relatively large amount of fruit per unit of leaf area. However, the individual fruits under these conditions will

be small and generally poorer in quality.

In order to obtain maximum production in fruits and nuts, therefore, it is necessary first of all that the growth conditions in the trees be such that a large leaf area per tree will be developed. This leaf area must then be protected from diseases and insects to enable it to function through the season. Moisture supply is of primary importance in maintaining leaf function. Maximum production apparently is dependent upon a large foliage area functioning at the maximum throughout the whole of the growing season.

J. R. Magness, Bureau of Plant Industry.

◀ Facilitate Distribution

RUIT and Vegetable Depots The commercial production of fresh fruits and vegetables has in Big City Markets increased tremendously during recent years. Modern means of

refrigeration and transportation have made possible their distribution over long distances and to all markets. Specialized producing areas have been developed in many sections of the country, from which constant supplies of a great variety of products are available throughout the entire year. Total car-lot shipments of fruits and vegetables have increased about 50 per cent during the last decade, and now amount to around 1,050,000 cars annually. As a result of this greater use of fruits and vegetables in the American diet, and the growth of city populations, there has been an immense increase in the amounts of these products handled each day through the markets of metropolitan areas. These highly perishable commodities must be distributed to retailers within a very brief time if their quality and freshness are to be retained. Many of the wholesale produce districts have become so overcrowded and congested, however, as seriously to hamper rapid and effective distribution. (Fig. 66)

To meet the needs for expansion and improved marketing facilities, transportation companies have in recent years constructed special depots in some of the large eastern markets for the exclusive handling of fruits and vegetables. These depots, or produce terminals, consist essentially of immense covered platforms, on which car-lot receipts are unloaded and sold. They have been built in connection with large railroad yards and team tracks, and usually are so located as to be readily accessible with a minimum of traffic congestion.

These terminals consist of one or more buildings, each with a floor space ranging in size from several hundred to 1,000 feet in length and approximately 75 to 125 feet in width. Railroad tracks extend along the sides, and the terminal floors are level with the doors of freight or refrigerator cars, so that unloading may be done with floor trucks. The railroad tracks are set in concrete paying and when the cars are moved out, wagons and trucks can be backed up against the platforms for loading. Sliding or folding doors all along the sides completely inclose the buildings during cold or stormy weather, and heat is provided during the winter. Some terminals are constructed with a full second floor the entire length of the building, furnishing office space for members of the local produce trade, while in others there is only sufficient upstairs space to provide auction rooms and offices for the railroad and terminal officials. Extensive cold-storage plants have also been built in conjunction with a few of these terminals.



FIGURE 66 —Interior view of a typical produce depot, with fruits and vegetables displayed for sale, Sliding doors along each side may be raised or lowered as desired

#### Produce Sold on Terminal Floors

In the cities where such facilities have been provided, most of the fruits and vegetables received in car lots are unloaded and sold on these terminal floors, with the exception of watermelons, which are sold direct from the cars on adjoining team tracks. In some instances cars are not completely unloaded on the floor, but a small number of packages are displayed and sales are made from these samples. Daily offerings range from 40 or 50 cars to as high as several hundred, depending upon the season and the particular market. Unloading is done during the night by employees of the terminal or transportation company, who transfer the contents of each car to designated locations marked on the depot floor. The various containers in each load are sorted according to marks, sizes, etc., and stacked in piles or rows, with a number of packages opened for display.

Sales are made either privately or by auction. The products which are to be sold at auction are displayed on a separate part of the floor, for the inspection of the buyers. Auction catalogue sheets are printed, listing in detail the number of each brand, size, or grade contained in each lot, and the auction sales are conducted in another part of the building on the basis of these catalogue descriptions. Citrus and deciduous fruit auctions are held in the rooms overhead, but for a few commodities such as cantaloupes and tomatoes an auction is frequently held on the main floor, with a portable stand for the auc-

tioneer. (Fig. 67.)

Private selling is limited to certain hours, usually in the early morning. As the time approaches for the opening of trading, everything is made ready for the day's business. Salesmen check their goods and complete their displays, and at the designated hour the buyers are admitted to the floor. The products are readily accessible for inspection, and quality, condition, size, and other factors of each lot may be readily determined. A great din arises, with hurrying feet, voices raised to shouts, and a great rattle of floor trucks as transactions are completed and purchases loaded into the waiting trucks and wagonfor delivery. To the uninitiated, pandemonium seems to reign, but actually there is a high degree of order and system, and the day's business progresses at a rapid rate.

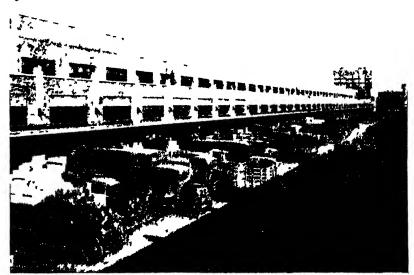


FIGURE 67—Exterior view of a fruit and vegetable depot after the day's sales have been made—Note railroad tracks where cars are spotted during the night for unloading

Where there is more than one building or sales floor, fruits are usually displayed and sold on one, and vegetables on another. There may also be further subdivisions of the fruits, such as between cantaloupes, deciduous fruits and citrus fruits, and on the vegetable floor between the more highly perishables such as tomatoes and lettuce, and the semiperishable potatoes and onions. Successive hours of trading are often established for each group of commodities, to enable the buyers to devote their attention to each in turn. Semiperishable products may be held over on the floor from day to day, and some terminals permit unsold goods to be reloaded into refrigerator cars. In most cases, however, the more highly perishables are either sold on the day offered, or are removed to other storages.

# Transportation Companies Provide the Facilities

The produce terminals so described are constructed by the transportation companies and serve essentially as depots for the unloading and delivery of fruits and vegetables, with the added privilege to the

receivers of conducting an organized market while the goods are temporarily held on the depot floor. Such terminals have been built in Philadelphia, Baltimore, Boston, Pittsburgh, and Detroit, and the same facilities are provided on the produce piers at New York City, although these have minor differences in construction and arrangement.

In some cities there has been a concentration of store facilities for wholesale produce dealers into continuous structures of uniform design, and many of these are also called produce terminals. There are, however, no general platforms or sales sheds provided for the unloading, display, and sale of goods received. In many cases these stores do not have adjoining rail trackage, and the commodities to be sold must either be hauled from the cars on near-by team tracks, or delivered to purchasers direct from the cars. Examples of large terminals of this type are to be found in Cleveland, Chicago, Buffalo, and Los Angeles. Smaller structures of similar character are located in several other cities.

Wendell Calhoun, Bureau of Agricultural Economics.

IPSY and Brown-Tail Moth Infestations Are Checked by Imported Parasites The gipsy moth was brought to the United States and accidentally established in Medford, Mass., in 1868 or 1869. The

brown-tail moth, another foreign pest, was first found in Somerville, Mass., in 1897. The caterpillars of both moths eat the leaves of various forest, shade, and orchard trees and, when abundant, completely defoliate such trees. Each pest requires a year to complete its life cycle and during this time it passes through four stages—egg,

caterpillar or larva, pupa, and adult or moth.

Between 1891 and 1900, when funds were made available by the Massachusetts General Court, satisfactory progress was made in reducing the numbers of the pests in the relatively small infested area, by using various hand methods to kill the eggs, larvæ, and pupæ. Unfortunately continued appropriations were not considered necessary from 1900 to 1905, and during this period the moths increased to such an extent, and spread over such a large territory, that hopes of exterminating them could hardly be entertained. In view of this situation it was realized that any method that offered possibilities in the way of control should be given a trial. Accordingly, in 1905 the Massachusetts General Court and the Congress of the United States appropriated money to be used in studying and importing into New England natural enemies that attack these pests in foreign countries. Except for the period between 1914 and 1922, this project has been continued, the Federal Government having had complete charge since 1911.

## Importations Mostly From Europe

For the most part the importations have come from European countries, but northern Africa and Japan have also been visited by members of the Bureau of Entomology and some material has been received from these regions. Great precautions have been exercised at all times to avoid the introduction of insects which might prove harmful.

Of the beneficial insects that have been imported, 11 of the established species have demonstrated their usefulness by reasonable multi-

plication and control results.

A beetle, Calosoma sycophanta L., which in both its larval and adult stages feeds on gipsy-moth caterpillars, and in its larval stages on the pupæ of the moth, was first liberated in New England in 1906. It is known to be one of the most important enemies of the gipsy moth. Both the larvæ and adults are able to climb up the trunks and

branches of rough-barked trees and thus to reach their prey.

Five parasitic wasps have been established. Two are minute forms that deposit their eggs within the gipsy-moth eggs, and these their larvæ destroy. One, Anastatus disparis Ruschka, was first released in 1908 and is more important than the other, Ovencytus kwanæ Howard, which was liberated during the following year. Field collections of gipsy-moth egg clusters have been made in which over 40 per cent of the eggs were killed by Anastatus. Of three other parasitic wasps, one, Apanteles melanoscelus Ratz., was first colonized in 1911. Its larva is an internal parasite of the gipsy-moth caterpillar. The other two species, A. lacteicolor Vier. and Meteorus versicolor Wesm., kill brown-tail moth caterpillars in the same manner. While A. melanoscelus and A. lacteicolor are important parasites of gipsy and brown-tail moth caterpillars, respectively, their value is unfortunately lowered because they in turn are rather generally attacked by other parasitic insects. M. revsicolor does not appear to be a parasite of prime importance.

Four important parasitic flies have also been established. Their larvæ feed within the caterpillars and kill them. Compulura concinnata Meig. was first liberated in 1906 and, besides being of special value as an enemy of both the gipsy and brown-tail moths, is also known to parasitize the larvæ of about 125 leaf-eating insects native to North America, and to have spread well beyond the area where the moths occur. Sturmia scutellata R. D., first released in 1907, is a valuable aid in holding the gipsy moth in check. Its habits are interesting in that the female fly deposits her eggs on the leaves upon which the caterpillars feed, and it is in this way that they become parasitized—the eggs hatching after being swallowed by the caterpillars. The two other flies, Sturmia nidicola Towns. and Carcelia laxifrons Vill., are both parasites of the brown-tail moth, the former being of

considerably more importance.

## Host Insects Have Spread

Although the first colonies of these beneficial insects were placed in the field about 25 years ago, it has required a number of years for them to increase and disperse and to attain their natural relation to the fauna of the region. During the same time the host insects have spread from the comparatively limited area occupied in 1905 until they are now found in the greater part of New England. At first the brown-tail moth, because of the flight of the adult moths, spread more rapidly and even reached the Canadian Provinces toward the northeast, whereas the gipsy moth, from a small area near the coast, has moved inland in all directions. The insect enemies have followed, although less rapidly than their hosts, and are now generally distributed throughout the infested region.

Since 1911 annual examinations of the developmental stages of the gipsy moth have been made at a series of observation points scattered over the area infested at the time, in order to determine the intensity

of infestation and the degree of parasitism. Similar observations on the brown-tail moth have been conducted since 1920. The results of these studies have shown a rapid building up of the colonized insects, beginning in 1912, and, from time to time in different parts of the area, fluctuations in abundance which have accompanied the fluctuations of the hosts. Innumerable other, but less systematic, observations during the whole period since the gipsy and brown-tail moths came to this country have emphasized the continual fluctuations in abundance of these insects. Figure 68 represents graphically the tendency of the annual fluctuations in abundance of the two host insects and of their imported natural enemies, based upon systematic observations within the limited area mentioned above.

Figure 68 indicates that the gipsy-moth infestation, which had already reached a high level in 1912, remained so until 1921, when it began to decline rapidly and reached the lowest level in 1924, again in-

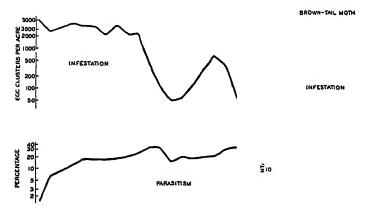


FIGURE 68 —Fluctuations in degree of infestation and degree of partistism of gipsy and brown tail moths in New England. "Egg clusters per acre" based on estimates made in special observation points. "Thousands of webs per town" refers to number of webs, in which caterpillars spend the winter, removed from trees and destroyed by State and town employees in towns considered

creasing in intensity until 1928 and falling off once more in the following two years. The corresponding curve of parasitism shows a general increase from 1912 to 1930, most rapid in the beginning, but maintained throughout the period except for the temporary falling off in 1924, when the infestation was at the lowest point. It is noticeable that the increase in parasitism continued (until 1923) beyond the point (1921) where the infestation began to decline.

Figure 68 also shows the general progress of infestation and parasitism of the brown-tail moth since 1920. Throughout this period the infestation has in general been at a very much lower level than it was between 1905 and 1920. It continued to decline until 1925, when it again began to increase. During this decade the fluctuations of parasitism have been more irregular than those of the gipsy moth. It is nevertheless seen that as the infestation was declining from 1920 to 1925 parasitism was in general increasing, and there is at least a suggestion in the curves that the two tendencies have approached a balance in the remainder of the period.

### Intensity of Infestation

It is notable that since the establishment of the parasites the intensity of infestation of neither gipsy nor brown-tail moth has reached the high level attained in the earlier y cars, whereas the curve of parasitism

has shown a general upward tendency.

Two of the imported parasites have been unexpectedly helpful beyond the immediate field for which they were intended. It has already been mentioned that Compsilura concinnata has become a valuable enemy of other destructive insects occurring in New England and neighboring areas. This fly has proved to be an efficient enemy of the satin moth, which is an introduced pest first found in New England in 1920. The same is true of a small parasitic wasp, Eupteromalus nidulans Thom., which was first imported from Europe as an enemy of the brown-tail moth, but which has never proved of appreciable value for its control in this country. These two introduced species are, as far as is known, the only important insect enemies of the satin moth in New England.

C. W. Collins and T. H. Jones, Bureau of Entomology.

IPSY-MOTH Eradication Project in New Jersey Apparently Successful In July, 1920, the New Jersey Department of Agriculture reported the finding of a severe gipsy-moth infestation on a large estate near

Somerville in that State. Investigation showed that this was by far the worst outbreak of this insect that had ever been found in the United States outside of New England. The female moths were depositing eggs on many of the tree trunks and the undersides of branches were so thickly covered with egg masses that the bark was almost completely obscured. Steps were immediately taken by the United States Department of Agriculture to determine the area infested and to apply treatment measures. The estate, which covered about 2,000 acres and was provided with 25 miles of roads and drives, was immediately closed to the public and the removal of trees and shrubbery was prohibited.

The worst part of the infestation centered in a 30-acre area of Koster spruce, several acres of which were completely defoliated. These trees had been imported from the Netherlands and other European countries in 1911, before the passage of the plant quarantine act regulating shipments of plants and plant products from abroad, and the insect

was brought to this country in that way.

It was determined at the outset that the work should be directed by the Federal authorities and that the Federal Government and the State should finance the project jointly. A hurried survey made during July and August resulted in the discovery of many colonies of the insect over approximately 100 square miles of territory centering around Somerville, but a more detailed examination during the months that followed indicated that it had spread over more than 400 square miles. The seriousness of the problem was increased as a result of finding the insect well established in the Wachung ridges which extend in a series of wooded ranges across the northern part of the State, and because 318 shipments of trees from the infested estate had been forwarded to

72 towns in the State, and 216 lots had been shipped to 17 other States. These shipments were traced and small infestations were found in Pennsylvania and New York as well as in nine scattered localities in New Jersey. Treatment measures were applied to all of these small isolated infested locations and the insect was exterminated during the

following two years. (Fig. 69.)
In November, 1920, the State legislature appropriated \$112,000 for conducting the work, \$25,000 was contributed by the owner of the estate, and on March 3, 1921, Congress appropriated \$225,000 for gipsy-moth work in New Jersey. Intense scouting and clean-up work was carried on during the fall and winter. It included cutting and burning large areas of badly infested trees and brush. Equipment was purchased and assembled so that upward of 20 high-power spraying machines were available for operation in the worst infested part of the



Figure 6)—Life stages of the gipsy moth 1, Female moth, B and F, pupæ (', larvæ of caterpallus, D, male moth; E, egg mass All about three-fourths natural size

territory early the following spring. Over 3,000,000 egg clusters were treated during the fall and winter and thousands of acres of tree growth were sprayed, more than 100 tons of arsenate of lead being used.

The movement of nursery stock and other materials likely to carry infestation was regulated by a State quarantine which was enforced by the Federal organization acting under State authority. As a result of the first season's work no trees have since been defoliated by the gipsy moth in the State of New Jersey.

#### Eradication Task Undertaken

The problem of exterminating the insect, however, was more farreaching and difficult than that of obtaining sufficient control to prevent obvious damage to vegetation. The habits of this insect were well known, the injury caused by it was a matter of record in the New England States, and the extreme difficulty of eradication after the pest had become well established over a wide area was fully appreciated. Nevertheless the opportunity was offered to exterminate it over a large and difficult area. This opportunity was accepted by the Government and the State of New Jersey with the purpose of ridding the State of the pest and incidentally of eliminating the possibility of spread from this source throughout the adjoining States and to distant parts of the United States.

The plan of operation after the abundance of the insect had been materially decreased in the central part of the infested area was to rotate the work in different sections of the territory. An area was thoroughly scouted by experienced men, the egg clusters destroyed by an application of creosote, the center of the colony and surroundings sprayed with arsenate of lead in the spring after the normal time for hatching of the caterpillars, and the results checked up by expert men. The use of these methods for a single year does not give positive assurance that eradication has been secured when areas of country as large as a township are concerned and where the growth is varied and the terrain is irregular. After a lapse of intensive work in such an area for a season or two, it must be very carefully reexamined, sometimes more than once, in order to be sure that the result aimed at has been accomplished.

### Various Methods Necessary

No set formula can be given for conducting an operation of this sort, as the methods used must be based on the conditions and on the nature of the tree growth in different sections of the territory. While wholesale cutting and burning of infested growth in some wild lands is the cheapest and most effective method that can be used, in residential sections or in areas where the tree growth is highly prized for shade or landscape effect, it is entirely impracticable, and more expensive methodssuch as treating egg clusters and spraying are necessary. The usual type of orchard sprayer is inadequate to meet the conditions of this work. Higher pressures are necessary to force the spray material through hose lines sometimes a mile in length. This is frequently required in heavily wooded areas. Special equipment such as hose that will withstand 1,000 pounds working pressure and specially designed couplings and nozzles must be used in order to effectively spray tall trees from the ground without climbing. Heavy truck sprayers can not be moved far from well-maintained roads and should be set up at the water supply in order to prevent the necessity of hauling water for the spray solution. (Fig. 70.)

Particular attention must be paid to the eradication of infestations along streams or watercourses in order that the egg clusters of the insect may not be spread to other localities on floating debris. In several instances it was necessary to mount spraying machines on small scows so that the trees along the edges of rivers might be sprayed when they could not be reached on account of swamps or flooded areas. This is only a single instance illustrating the ingenuity shown by the workers in the field in surmounting difficulties that arise in

certain parts of the territory.

After the known infested area and the colonies in the outlying sections had been given careful attention, scouting was taken up in a belt of townships approximately 10 miles wide, beyond those where infestation had previously been found. This was necessary in order to make

sure that there were no outlying colonies, and increased the area in New Jersey requiring careful scouting to more than 2,300 square miles. Each year since this outer belt of townships was scouted the plan has been to gradually close in toward the center. In this way the territory has been gradually reduced and the expenditures decreased accordingly.

The largest expenditure made during the progress of this work was in 1923, when \$295,000 of joint State and Federal funds were used.

#### Last Live Moth Found in 1929

The last live gipsy moth was found in New Jersey in June, 1929, but considerable work has been required in reinspecting territory in the central part of the area. This is a tedious and expensive operation. Not only is excellent eyesight necessary on the part of the men employed but a system of checking the work that has been covered is essential to prevent colonies of the insect from being overlooked. Dur-



Figure 70 —Spraying woodland in New Jersey The spray is being applied to trees in the background more than 2,000 feet from sprayer in the right foreground

ing the last three seasons traps baited with a material that will attract male gipsy moths have been used throughout the greater portion of the area that was once generally infested in order to secure additional evidence as to the presence of this pest, but no moths have been caught.

Since the work began in New Jersey there has been expended on this projectover \$2,200,000. It is estimated that the cost of carrying through the reinspection work during the next year will be approximately \$40,000, after which time, if no new infestations are found, a small amount of checking work should be done for a few years in the localities which are most likely to be infested, as a precautionary measure. (Fig. 71.)

The New Jersey gipsy-moth project covers the largest area where an attempt has been made to exterminate rather than to control this insect. Excellent cooperation has existed between the Federal and State organizations. This has been supplemented by sympathetic interest on the part of the citizens living in the infested territory. This attitude is particularly commendable when it is realized that in many cases the insect occurred in such small numbers that no visible damage could

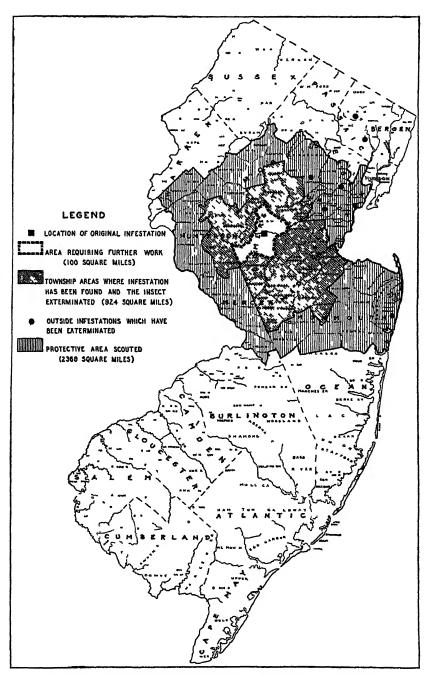


FIGURE 71.-Status of gipsy moth eradication project in New Jersey, April 15, 1931

be observed and that it was necessary to cause the owners serious inconvenience in order that exterminative measures might be applied to their property.

A. F. Burgess,

Plant Quarantine and Control Administration.

OME Accounting
Makes Good Headway
Among Farm Women

Rural home makers throughout the United States who have been keeping household accounts in cooperation with the Extension Service of the

United States Department of Agriculture, report that household accounts tell them: (1) Where the money is going; (2) how much the farm is furnishing toward family living; (3) how to plan future expenditures that will bring more satisfaction to the family; (4) how to establish habits of thrift with the children; (5) how to divide the money wisely according to the many family needs; (6) how to adjust family disputes that arise in relation to money matters; (7) how to buy wisely and use the money intelligently; (8) the total amount of money spent for family living; (9) how to maintain desirable living standards through changing economic conditions.

In a number of States farm men and women have been meeting together for 2-day conferences to discuss the farm and home economic conditions of their counties and communities and to make recommendations as to better ways of farming and home making, based on their years of experience and on information which the extension agents are able to provide. During these discussions the men and women have analyzed the cost of living on the farm for the average family of five members. The analysis included the details of how much cash is required to provide the food supply; how much money is needed for clothing; the amount to be allowed for fuel, light, operating expenses of the home, and replacement of furnishings; what should be set aside for education, recreation, and community activities; and such items as personal needs and gifts. A comment made most frequently by the rural women taking part in these discussions was that they did not know how much money the family was using. In consequence, in every State the women have asked the extension agents to assist them in keeping household accounts.

The usual procedure has been to enroll in a study group the home makers who had become interested in household-account keeping. Many of these women were wives of farmers who were keeping farm accounts, and thus at the end of the year the totals for family living and farm expenditures could be analyzed and changes in management practices for both the farm and the home for the next year could be plotted. In other cases the interest of the wife in household accounts led her husband to start farm accounts.

The Extension Service sometimes furnished the household account book free or at a nominal cost. Often the women used a notebook and ruled columns, putting in the headings for the expenditures, or obtained the account book from banks or other commercial agencies.

## Value of Accounting Recognized

At the first meeting of the study group the women discussed with the extension agent the method of entering the various items of expenditure, and simple ways and means of keeping accounts, such as a wall

board on which the monthly sheet was thumb tacked, a pencil tied to a string, and a spindle to hold bills were fastened. At subsequent meetings the account keepers discussed the purchasing of clothing, the value of the garden products as a contribution toward the family living, the high cost of entertaining, the need of wise expenditure of funds for upkeep of the house and furnishings, how to obtain the cooperation of the family in keeping accounts, and how to teach boys and girls money management. At the end of the year the group met to make an analysis of their total expenditures. In some cases the Extension Service staff, or research workers of the land-grant colleges, gave assistance in making the analysis and helping to draw conclusions. The consensus of the women was that their accounts had been so valuable that they would not consider discontinuing them.

The comments made by household-account keepers, taken from the extension agents' reports, tell vividly the value they found in account

keeping:

A mother and father who were looking forward to giving their children a college education said that they never would have been able to save the money if they had not kept accounts and worked out their budget in advance.

One home maker said, "You know, I thought I wasn't spending any money this year, and here my total money expenditure is higher than

that of any other home maker in our group."

Many human interest stories tell of complete changes in the management of the home as a result of account keeping. An especially interesting story is that of a family in which the husband had had several operations and the family had become burdened with debt until they were almost hopeless. By keeping accounts they found that they were doing too much entertaining, and too much of the work, including food production, that could be done in the home, was being done outside. After keeping accounts for only a few months they were able to adjust matters so that they expected to clear their debt by the end of the year.

#### Influence on Health Habits

Account keeping often affects health habits, as is illustrated by this story. One woman stated that when her two little girls were born, while she was living in the city, it was necessary to purchase milk. In order to economize, the youngsters were denied an adequate supply, and in their teens these girls had trouble with their teeth. Later, the family moved to a farm, and two little boys were born. These youngsters had plenty of milk and have always had good teeth. The mother said that she realizes now that she might have saved much of the dental expense for the girls had she purchased milk for them while they were growing.

Another woman states that even though she is very busy and does not have money to spend on luxuries, she finds it worth while to keep a strict account so as to make the pennies go as far as possible. By

keeping accounts she was able to improve her whole house.

Another woman comments that the greatest value she received from keeping accounts was that they enabled her to be sure that her income was being used to the best advantage. She also reported that the suggested budgets did not suit her needs. In order to reach her goal, of having her income sufficient to enable her to live as she had been

accustomed if the income stopped, she changed the percentage for

savings given in the suggestive budgets to a much higher one.

It is difficult to estimate the value of keeping accounts from the point of view of changed attitudes and habits of living, but extension agents report that rural people feel that knowing how much money the farm is earning, and how that money is being spent, gives them a basis of comparison with the cost of living in the city, and makes many of them decide to remain on the farm. Accounts also furnish home makers with fact information that is not merely hearsay or a panacea. They prove that raising vegetables for home use is profitable in many instances, and that certain practices relating to buying materials for the home are economical. What is still more important is that keeping accounts and having family councils on money matters have made for happier family relationships.

Very few rural women have yet come to the place where they are willing to pay for the services of a trained person to assist them in household account keeping. The farm-management specialists report that farmers to-day are willing to pay as high as \$25 a year for the assistance of a trained worker in farm account keeping. Perhaps the day will come when rural home makers will be willing to pay for a service of this kind, since it is fundamental in getting the most from

the money earned by following the profession of farming.

MARY ROKAHR, Extension Service.

ME-DEMONSTRATION
Agents Assist in Developing
Farm Family Resources

Despite hard times and greatly reduced cash incomes, thousands of farm homes became better places in which to live during

1931. Early in the year many families realized that filled pantry shelves and storage bins, supplemented with all-year gardens, would be the best insurance against hunger and want during the winter. Consequently, extension agents emphasized the value of year-round gardens, fall gardens, the utilization of practical irrigation systems, hotbeds and coldframes, and the introduction of new kinds and varieties of vegetables, berries, and small fruits. Planting of improved home gardens was encouraged in many localities by establishing a demonstration garden, which showed what to plant, when to plant, how to cultivate, and how to take care of a continuous succession of growing crops.

In Arkansas, for example, home-demonstration agents visited 100,000 gardens in 1931. Of these 2,500 were demonstration gardens. Approximately 4,260 gardens on Arkansas plantations were supervised by Negro extension agents. Nearly 40,000,000 quarts of fruits and vegetables and other home-grown products were canned in 56 counties employing home-demonstration agents, and 45,592 farm families marketed \$1,114,802 worth of surplus garden, poultry, and home-dairy products. In November and December, 1931, 6,399 beefcanning demonstrations were made by home agents in Arkansas.

Nearly 42,500 families had fall gardens.

In promoting the live-at-home program, Texas farm and home demonstration agents helped to increase farm home gardens 45 per cent in 1931 over the previous year, to more than treble the amount of canning, and to extend the home production of meat to 75 per cent of the farms. About 50,000,000 cans and jars were filled with

vegetables. More than 64,500 farm families provided a home supply

of meat by canning. (Fig. 72.)

A food plan or budget for a farm family of five for one year, outlined by Texas home-demonstration agents, called for the production of \$547 worth of food on the farm and the purchase of but \$63 worth. The home production and conservation program called for a sufficient supply and variety of foods, including pork, beef, lamb, chicken, dairy products, vegetables, fruits, and cereals. The agents encouraged farm women and girls working under their direction to standardize surpluses and offer them for sale.

Farm home products were marketed more extensively during 1931 than ever before. While some of the money returns may appear small, the cash received in many cases covered one or more important family needs. It paid the mortgage interest; bought the schoolbooks

and clothes; clothed the family for the year; paid the year's grocery bill; bought labor-saving equipment for kitchen, or laundry, or home dairy, or poultry work; painted the house; improved the living room; or kept a boy or girl in college. No other way of taking care of some of these items could have been provided.

In Garfield County, Okla., total sales in one farm women's market amounted to \$14,225. In Arkansas 22 market-gardening



FIGURE 27—A Texas farm woman with her home-preserved food supply In 112 counties in Texas 256,217 farm families provided part or all of the year's food supply from canned vegetables, fruits, and other farm products

demonstrations were conducted. Several roadside markets made a

substantial contribution to the live-at-home campaign.

Thirty-nine home-demonstration markets in North Carolina sold \$236,517 worth of products through club markets, carload shipments, and individuals. In South Carolina total sales as a result of home-demonstration marketing work amounted to \$293,738. Eighteen club markets in Alabama reported sales of \$347,652.

Farm women in Texas counties pooled their homemade rugs to fill an order placed by the manager of a large department store in Dallas for 100 hooked wool rugs. Their quality carefully protected by home-demonstration standards, a wide variety of products is sold privately in stores and in special markets by women and girls

in Texas under the distinctive Better 4-H Products label.

The money with which to pay for needed household equipment or furnishings has often been supplied through the sales of farm home products from gardens and orchards, poultry flocks, and home dairies. The records also show that many other things have been sold, such as homemade rugs, canned goods, baskets, tooled-leather articles, quilts, gloves, and many other special homemade products.

Recognizing that convenience, comfort, and beauty in the home, well-kept grounds, appropriate clothing, and wholesome recreation are essential, agents encouraged farm families to strive to attain these ends in practical and economical ways. More farm women in Texas enrolled as demonstrators to improve their living rooms in 1931 than in 1930 and greater interest was shown by the club girls in improving their bedrooms. Some of the women have exchanged quilts for rugs, canned goods for furniture, and so on. Often keen family interest in home improvement has led to the exchange of field labor for labor in painting the house, in paper hanging, or in installing plumbing.

Much resourcefulness and ability are shown in the use of shrubbery in beautifying home grounds. Satisfying improvements have been

accomplished by work involving little or no cash outlay.

There has been more organized group activity in community improvement, road and highway beautification, and wholesome recreation.

OLA POWELL MALCOLM, Extension Service.

TOME-DEMONSTRATION

Approximately 1.200 counties in Work Influences Farm the United States now have county ■ Women, Survey Shows home-demonstration agents who work with the farm women on

problems closely associated with the home. In a large proportion of the remaining counties considerable work with farm women is done by the county agricultural agents with the assistance of the home-

economics specialists from the State colleges.

During 1930 extension agents reached 646,000 women through formal groups organized for study purposes. In addition, many women were reached individually by extension workers, and much information was passed on to neighbors by local leaders and others affiliated with the various home-demonstration clubs or home-bureau groups, as they are variously called in the different sections of the country.

In order to obtain reliable information on whether extension teaching actually is causing farm women to take up improved methods of home making, personal interviews with all the farm women in representative areas of 16 States have been held. In 12 of the States homedemonstration agents have been employed in the counties involved in the studies for an average of six years. In two of the States the counties studied had had the services of a district home-demonstration agent serving from three to four counties, while in the remaining States the only home-economics extension conducted outside of emergency work, during the war period, was handled by the agricultural agents, with the assistance of State home-economics specialists.

According to the information supplied by the women themselves, new or better practices have been accepted as part of the regular home procedure in 32 per cent of all the farm homes in the areas studied. The percentages of homes reporting changes due to extension teaching ranged from 7 per cent to 65 per cent. The number of changed practices reported varied from 12 to 177 per 100 homes. The changes most frequently reported related to clothing and to food preserva-Other changes reported with great frequency dealt with food

preparation and the nutritional technic of feeding the family.

As these four lines of work are equally applicable to homes of owners and tenants, it was not surprising to find that approximately the same percentages of each have been influenced by extension.

#### Size of the Farm a Factor

The size of the farm apparently has some bearing upon the adoption of better home practices, the percentages of homes influenced being a little higher on the larger farms.

The distance from the county extension office, and whether the home was situated on an improved or an unimproved road, had little if any

bearing upon the adoption of home-economics practices.

In six areas where information on educational training of farm women was obtained it was found that a definite relationship existed between the amount of formal schooling received and the extent to which home-economics practices were changed.

On the other hand, age of farm women seemed to have little bearing upon the adoption of new or better practices, the older women reporting practices changed about as frequently as the younger

women.

By far the most important factor affecting the adoption of practices was contact with extension workers. Where farm women had attended home-demonstration meetings or had otherwise come into personal contact with the home-demonstration agent or State specialist, six times as high a percentage reported practices adopted as was true among women making no such contact. More than twelve times as many changes per 100 homes were also reported for the contact group as for the noncontact group.

In order to get the most out of extension work farm women should belong to the local home-demonstration club, attend extension meetings, and in other ways inform the extension workers of their interest

and individual problems.

Home-demonstration workers must assume the responsibility of stimulating interest and influencing the women outside of homedemonstration clubs, by means of bulletins, circular letters, personal visits, news stories, and similar means and agencies.

M. C. Wilson, Extension Service.

ONEY Grading Stamps
Give Consumer Full
Confidence in Product

In the United States there are found honeys of many distinct flavors, each flavor determined by the variety of flower from which the bees gathered

the nectar. In certain regions where farms are large it is not uncommon to find hundreds of acres of a single variety of nectar-producing forage plant. The white-clover belt in the central northern part of the United States produces white-clover honey in large quantities. In the Intermountain States, Nebraska, and the Dakotas, alfalfa and sweetclover furnish enormous crops of honey. The honey in the Pacific Coast States comes largely from alfalfa, orange, sage, star thistle, and fireweed, whereas in the South tupelo, sourwood, gallberry, and cotton are the principal sources. Buckwheat honey in commercial quantities is furnished chiefly by New York and Pennsylvania.

It is only natural to expect a variation in color, flavor, and physical appearance of honeys coming from such a wide geographical range. Honeys vary in color from water white to very dark amber. There is some correlation between the color and the flavor of honey, the dark honeys usually having a more pronounced flavor than those of lighter color. Tupelo and sage honeys remain in clear liquid form almost indefinitely, whereas honeys from alfalfa and sweetclover crystallize shortly after their removal from the hive.

Honey is available in two forms—extracted and comb. Extracted honey is produced by the bees in the same manner as is comb honey



FIGURE 73 -It's all good honey

except that it is made in larger combs; the liquid honey is afterwards separated from the comb by means of a centrifuge or extractor. Extracted honey, in its liquid or in its granulated form, is sold in tin cans, pails, Comb or glass jars. honey, on the other hand, is sold in the small square sections just as it was sealed by the bees. (Fig. 73.)

# Product Merits Consumer's Confidence

As relatively few persons ever have an opportunity to familiarize themselves with beekeeping, the great majority have no conception of the manner in which honey is produced commercially. They therefore look upon all honey with suspicion, whereas, so far as genuineness and purity are concerned, there is probably no

food product on the market in which the consumer may place greater confidence. In the first place, adulteration of honey is not a profitable undertaking and, therefore, has never presented a problem to State and Federal pure-food officials. Although the pure-food law prohibiting the shipment from one State to another of impure or adulterated honey as pure honey has been rigidly enforced, less than a dozen instances of misbranded or adulterated honeys have been found by Federal inspectors since the passage of the law in 1906. In the second place, the only difference between the commercial

honey of to-day and the bee-tree honey of yesterday, in which some persons still have such faith, is in the matter of cleanliness. Bee-keepers have gone a long way toward perfecting clean methods of handling honey, but they have not changed the product of the bee. Recently the Department of Agriculture, by recommending and putting into official use the United States grades for honey, has

Recently the Department of Agriculture, by recommending and putting into official use the United States grades for honey, has taken still another step to insure the consumer access not only to genuine honey, but to the best honey. These grades cover every form of honey produced and the fundamental principle underlying them all is that the honey must be of good edible quality. For example, between the two grades of extracted honey designated as Fancy and No. 1, practically the only difference is that the latter may have air bubbles and small particles of wax which are not permitted in the former. In the grades of comb honey the difference is largely a matter of color and evenness of cappings and the completeness with which the bees have filled all the cells of a section, although in all grades sections are sold by weight. (Fig. 74.)

The employment of the United States grades by producers of honey carries with it the privilege of using Government grading stamps, which offer a medium for describing the many commercial honeys

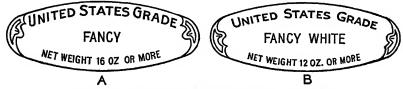


FIGURE 74 -Grading stamps A, Extracted honey, B, comb honey

produced in this country. As the consumer learns what these grading stamps signify, he discovers that it is possible to obtain exactly the color and quality of honey which he desires. By bringing about a better understanding on the part of the consumer, the United States grades for honey not only facilitate sales, but they also give the consumer greater confidence in this most wholesome of sweets.

GEORGE E. MARVIN, Bureau of Entomology.

NBREEDING Experiments with Guinea Pigs Are a Guide in Stock Breeding

"Never practice close inbreeding if you want vigorous and prolific livestock," is advice often heard among farmers. There is also a common be-

lief that the stock will run out and that they will lose size and be more subject to disease. These results have been experienced by many

farmers who have inbred their stock extensively.

In the endeavor to obtain more definite information on the effects of inbreeding than general observation has furnished, the Bureau of Animal Industry planned an experiment that has been conducted continuously for the last 25 years. The purpose was to determine the effects of close inbreeding when carried on for successive generations. Guinea pigs were selected as the experimental animals because an extensive experiment of this nature with the various classes of livestock would be too expensive and would require too much time. In

general the results obtained with guinea pigs should be similar to those likely to be obtained with larger animals.

The experiment has now extended through 30 generations of the closest possible inbreeding—that of matings between brother and sister. Data on about 25,000 animals have been recorded during the quarter century. To accomplish this same amount of work with cattle would require about 120 years, with sheep about 70 years, and with hogs 40 to 50 years.

The experiment was begun with 35 lines of guinea pigs, but 11 failed to produce a second generation and 1 line was disposed of because of a skin disease, thus leaving 23 lines in the experiment. Between 1906 and 1911 some of these 23 lines became extinct, because of weakness, and between 1911 and 1917 three or four other lines were disposed of because they could not be maintained by brother-sister matings. Only five lines continued through the 25 years. For comparison with the closely inbred lines, a control stock was established in 1911 and maintained by matings not more closely related than third cousins.

# Practical Examples in Hog Raising

At the beginning of the experiment the five lines differed in number of young per litter, birth weight and weaning weight of the young, percentage of young born alive, and percentage of those born alive which were raised to weaning. All these factors mean profit or loss to

livestock producers.

Let us consider, for example, the results of the guinea-pig experiment in terms of swine. In the number of young per litter, there was a decrease of nearly 27 per cent in all the inbred lines of guinea pigs for the 25-year period. At the same decrease in swine, if sows at first produced 12 pigs to the litter, at the end of about 30 generations of inbreeding they would produce only 8 or 9 pigs to the litter. But this is assuming all are born alive. After 30 generations of inbreeding it was found that there was a decrease of over 20 per cent in the number born alive. Accordingly, the number of live pigs would be only 6 or 7, and of these, only 4 or 5 would reach maturity and be marketable. Certainly there would be no profit in this. It is true that all the five lines of guinea pigs did not have so great a decrease in litter size or so great a mortality. Some breeds of hogs might suffer more or others less from the practice of close inbreeding, but, in general, it would not be a safe procedure for the average farmer to follow.

Swine breeders usually aim to produce spring and fall litters. Guinea pigs normally breed every 69 days, a frequency which makes possible 5 litters during the year. Inbreeding reduced fertility to such an extent that instead of 5 litters, only 3 litters a year were produced on the average by the inbred stock. In hog production this loss would not be so great as with guinea pigs, but it might delay breeding to such an extent that in some years production of 2 litters would not

be possible.

For the last 15 years of the experiment, records were kept of matings which proved to be completely sterile. During this time nearly 10 per cent of the matings never produced a litter. It is true that the fertility of the stock at the beginning of the experiment was not known, but 10 per cent sterility seems large and with any class of livestock would be a serious loss.

# Signs of Progressive Weakness in Inbred Stock

Mortality losses in these studies included young dying just before or at birth and those dying between birth and weaning. The first group is known among stockmen as stillbirths. This type of mortality is probably an indication of weakened constitution or some physiological disorder in the dam, a condition which interferes with the birth of living young. In the guinea-pig experiment the number of still-births increased as inbreeding progressed. The number of young dying between birth and weaning also increased as inbreeding progressed, a fact which probably indicates weakness in the young as well as in the dam.

The mortality of the mature guinea pigs was also taken into consideration. The death rate of females was much greater than that of males during the reproductive period of the females, but there was considerable difference in female mortality among the five inbred lines. Two lines had a very heavy death rate at the birth of the first or second litter. In two other lines the female produced three or four litters and then died. In the fifth inbred line the females had a greater length of life than those in the noninbred stock. If there are such differences in breeds of livestock, it would certainly be advisable for the farmer to select strains of known long life for his breeding stock.

Weight apparently was influenced less by inbreeding than by the factors just discussed. In most of the lines there was a lower birth weight and weaning weight than in the foundation stock and early generations, but some lines showed a gain. In every case the percentage of change in birth weight during the 25-year period was much less than the percentage of changes in fertility and mortality. Gains between birth and weaning, however, dropped about 33 per cent. In every case the weaning weights at the end of the 25-year period were less than those at the beginning of the period and averaged nearly 25 per cent less. Let us consider these results also in terms of swine. Even though inbred pigs at birth might weigh the same as those not inbred, the gain up to a certain age would be 130 pounds instead of 200 pounds. Thus the farmer would have to feed his pigs for a longer period in the effort to bring them to a desired market weight. The same would hold true for beef steers and market lambs.

# Control Stock Also Declines, Though More Slowly

All the foregoing facts make a bad case for inbreeding, but comparisons with the noninbred stock indicates that other factors may have been responsible for some of the decline experienced. In 1911, when observations on the noninbred stock were begun, there was very little apparent difference between it and the inbred lines. The noninbred stock, however, has shown declines similar to those of the inbred stock in nearly every respect except that they have been at a less rapid rate. Apparently the control stock is more nearly maintaining its vigor. Change in size of litter has been about equal in both inbred and noninbred stocks. The increase in mortality among the inbreds has been about twice as fast as in the noninbreds. In weight at birth and weaning, the noninbred line made a gain during the 25-year period, but the gain at weaning was much lower than the gain in birth weight because of lower percentage gains.

# Many Interesting Variations Observed

This condition complicates matters and makes one wonder whether the damage attributed to inbreeding really was due to such inbreeding itself or to other causes. As a matter of fact, inbreeding and certain other causes, which we may call environmental, are probably operating together to give the results obtained. Some of the evidence to show that inbreeding does play a large part in the decline of the guinea-pig stock lies in the fact that the noninbred lines did not decline at so rapid a rate as the inbred. Another may be in the fact that there is only one-third as much sterility in the noninbred stock as in the inbred lines.

Still further proof may be in the difference among the various inbred lines in their response to inbreeding. The five inbred lines differed from one another under the same conditions of feed and management. If these conditions alone were responsible for the decline in the various factors mentioned, one could reasonably expect a similar percentage decline in all lines, and that all would maintain their same relative ranking in fertility, mortality, and weight. This is not the case, however. The line which produced the smallest litters in 1906 produced the largest in 1930, and the one which produced the largest in 1906 had fallen to second place in 1930. The greatest decrease in litter size was almost 37 per cent, whereas the smallest was only 3 per cent. The line with the highest mortality at birth at the beginning of the experiment has become next to the lowest in this respect but has suffered the greatest loss in birth weight and weaning weight of its young. The three lines with the lowest mortality at birth in 1906 had the highest mortality in 1930.

These and many other similar results bring out the point that inbreeding has intensified and fixed certain hereditary differences in size and frequency of litter, rate of gain, mature weight, and mortality. The hereditary basis for such differences is very complex and only by intensive inbreeding is it possible to establish true breeding strains. There is added difficulty, however, in combining all the desirable characteristics in one line. For instance, the line with the greatest fertility and longest life has the disadvantage of low weight. Also the line producing the heaviest young has the disadvantage of high death rate. Thus, frequently when several characters are concerned the good points are counterbalanced by undesirable ones. These undesirable characters are intensified by inbreeding just as are the good ones. Thus it is distinctly advisable for the breeder to use only superior individuals if he breeds closely. Inbreeding may be a valuable instrument for remedying defects, but as in surgery it should be guided by an experienced and expert hand.

O. N. EATON, Bureau of Animal Industry.

APANESE Beetle Has Found Conditions in Eastern States Ideal Fifteen years have now elapsed since the Japanese beetle was first discovered in the United States. Observation and experience have shown unmistakably that the

beetle has found conditions, in the eastern portion of the country at least, ideally suited for its rapid multiplication; favored host plants in abundance; and an almost total lack of parasites, native to this new environment, able to hinder its development to any marked extent.

#### Distribution in the United States

The influence of modern agencies of transportation and commodity distribution upon the dispersion of an insect is well illustrated by the dispersal of the Japanese beetle. All available data support the belief that the beetle, although a vigorous flyer, is exceedingly erratic in its flight and its average rate of natural dispersion is not normally in excess of about 5 miles a year. However, a much more rapid distribution is inevitable and has actually occurred as a result of present-day transportation methods. The approximate distances from the original point

of infestation (Riverton, N. J.) to the most distant points where beetles were found during the summer of 1931 are, to the north (Little Falls, N. Y.), about 220 miles; to the east (Boston, Mass.), about 270 miles; to the south (Charleston, S. C.), about 575 miles; and to the west (Columbus, Ohio), about 430 That the dismiles. tribution has not been much more widespread may properly be credited to the enforcement of Federal and State quarantine restrictions on the movement of various carriers and products.

The area of distribution at the close of the 1931 beetle season may be roughly divided as follows (fig. 75): A



FIGURE 75 — Map showing distribution of Japanese beetlain 1931; zone of continuous infestation shown by cross lines, zone of discontinuous infestation shown by dotted area, separated points shown separately

zone of continuous infestation, which comprises the southern three-fourths of New Jersey, with the exception of the lower one-half of Cape May County; the southeastern counties of Pennsylvania, adjoining the city of Philadelphia, as far west as Quakertown, Pottstown, Coatesville, and Kennett Square; and the extreme northeastern corner of Delaware as far south as the vicinity of Delaware City. Beyond this area, a zone of discontinuous or localized infestation, the outer limits of which are indicated by such localities as Boston and Springfield, Mass.; Albany, Little Falls, Binghamton, Elmira, and Watkins Glen, N. Y.; Sayre, Williamsport, Lock Haven, Altoona, and Chambersburg, Pa.; Hagerstown and Brunswick, Md.; Washington, D. C.; and Alexandria and Norfolk, Va. Still far-

ther out, a number of widely separated points of limited infestation, such as Buffalo, N. Y; Erie, New Castle, and Pittsburgh, Pa.; Cleveland and Columbus,

FIGURE 76 —Lighter patches indicate turf killed by Japanese-beetle grubs

land and Columbus, Ohio; Richmond, Va.; and Chaileston, S. C.

# Population Density

An outstanding factor in the situation has been the amazing reproductive capacity of the insect under favorable environmental conditions. When the Japanese beetle was first discovered in August, 1916, only a very few beetlescould befound; three years later, in the same immediate

vicinity, from 15,000 to 20,000 could be collected by hand by one person in a day; in 1929, on a 15-acre lawn not many miles distant, approximately 10,000,000 beetles were caught in traps in 44 days. At favored points of heavy infestation, such as in well-kept lawns or golf greens (fig. 76), an average of from 350 to 400 grubs (the larval or

immature stage of the beetle) to the square yard is not in-

frequent.

Despite this alarming rapidity of increase, it should be borne in mind that scarcely any other part of this country offers so favorable a combination of environmental conditions of temperature, rainfall, soil types, and host plants as is found in the present zone of continuous infestation. The insect, being a native of Japan, is evidently adapted to an insular rainfall. These conditions are in general most nearly approxi-



FIGURE 77 - Defoliation of apple tree by feeding of Japanese beetles

mated on our eastern seaboard, whereas farther inland, where prolonged summer droughts are of rather frequent occurrence, as well as extremes of heat and cold, the climate would appear to be less favor-

able. There is evidence that the Japanese beetle is adversely affected by droughts, especially if these come at a time when eggs are being laid and hatched. Furthermore, data at hand seem to indicate that the maximum-infestation peak in a given locality may remain at the high level for only a relatively few seasons, and be followed thereafter by a noticeable decline to a lower level of abundance and destructiveness.

#### Host-Plant Groups

Observations over a period of years have shown that, while the Japanese beetle will feed upon more than 250 species of plants, the preferred food plants number only from 35 to 40. The fruit trees most subject to attack are the apple,



FIGURE 78 - Japanese beetles clustered on ripening peaches

quince, peach, cherry, and plum. (Figs. 77 and 78.) Not only is the foliage attacked but the fruits as well, especially of the early ripening

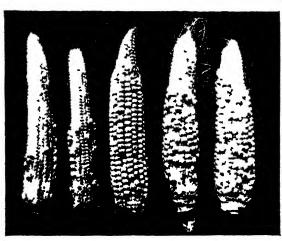


Figure 79 —Typical imperfect pollination of coin resulting from Japanese beetle feeding on silk

varieties. The pear is an outstanding exception, both foliage and fruit apparently being almost entirely immune to beetle attack. Among the plants bearing small fruit, the grape, raspberry, and blackberry are most subject to attack, especially the grape; the fruits of these varieties, however, are rarely, if ever, eaten by the beetle.

Truck crops are seldom seriously injured by the beetles, though in restricted areas of exceptionally heavy

concentration beetle damage to foliage or blossoms of rhubarb, peas, beans, and similar garden crops may at times be quite severe. Sweet corn is a noteworthy exception to this rule; the foliage suffers but

little in most instances, but the green silk is very attractive to the beetles and is fed upon extensively, the result being to prevent, or to seriously interfere with, the pollination of the ear. (Fig. 79) In commercial plantings the reduction in recent years in marketable ears as a result of this feeding has run as high as 100 per cent.

In recent years it has been found that the grubs at times feed rather extensively on the roots of various truck crops. Appreciable damage to the roots of such crops has frequently been observed even when the crops were growing in well-cultivated plots or fields. Examples of plants suffering such damage are strawberry, sweetpotato, beet, eggplant, tomato, and carrot.

Among field crops, beetle feeding of any consequence is limited to corn, soybean, and red clover. Injury to field corn has been increasingly observable in recent years, particularly in parts of eastern Penn-



FIGURE 80 —( h tracteristic skeletonizing of folinge by J spanese beetles

sylvania; this crop frequently suffers in the same way and nearly to the same extent as sweet corn Severe injury to soybean has also been noted in a number of instances.

In the group comprising ornamental trees and plants, shade trees are favored food plants of the beetles. The varieties most commonly attacked are sassafras, linden, elm, horsechestnut, Lombardy poplar, and willow. Conifers are practically immune, with the exception of larch and bald cypress, which are frequently almost completely stripped. Forests, however, can be considered as completely immune to beetle attack. Manyornamental flowering shrubs and plants, including shrub althea, rose, hollyhock, butterflybush, evening-primrose, dahlia, phlox, and aster, are generally and regularly attacked. Foliage injury is quite consistently typical; defoliation is not immediate, but the leaves are first skeletonized, then turn brown, and are soon shed. (Fig. 80) Flowers are iddled by the beetles feeding on and perforating the petals.

It is generally believed that the eggs of the Japanese beetle are for the most part deposited in grassy areas, and seldom in cultivated ground However, there have been observed a number of instances of severe grub injury to the roots of some varieties of nursery stock growing in well-cultivated plots in commercial nurseries (fig. 81), the varieties affected include azalea, rhododendron, arborvitæ, and hemlock. The injury is due not so much to grubs feeding on the rootlets as to the girdling of the main root at a depth of from ½ to 1½ inches below the surface of the ground. Even when girdling is not complete, the partial injury to the top of the plant, making it unsalable, is equivalent to

a total loss from the standpoint of the commercial grower.

#### **Parasites**

In spite of the fact that the beetle has been abundant in the central area of infestation for more than 10 years, and while some species of the native white grubs or June beetles present in limited numbers in this area are attacked by native parasites to some extent, there is little evidence so far that these parasites have attacked, or are likely to attack, the Japanese beetle in either its adult or larval stage.

Of the 15 species of foreign parasites of the beetle which have been introduced into New Jersey from time



FIGURE 81 —Girdling of stem of nursely plant (indicated by arrow) caused by Japanese beetle larvæ

to time since this work was started in 1921, 5 species have become established within the area generally infested by the Japanese beetle. These parasites belong to two general orders or groups of insects, the Diptera or fly group and the Hymenoptera or wasp group. The parasite species of the former group do not find conditions quite so favorable for their development as do the latter; they apparently require a somewhat more northern habitat, where the life cycle of the beetle will conform more closely to the requirements of the parasite. However, the two species of parasitic wasps of the latter group give considerable promise, and numerous colonies have been liberated throughout the area of heavy beetle infestation.

#### **Artificial Control Measures**

Reasonably adequate control measures have been developed to pro-

suitable sprays of stomach poisons or contact insecticides. Likewise, quite satisfactory methods have been devised for the "grub-proofing" of lawns and golf courses. (Fig. 82.) Several methods have been

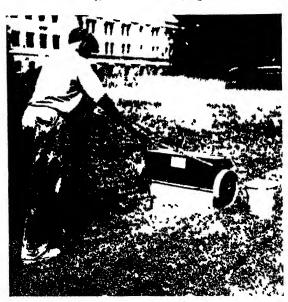


FIGURE 82 - Applying lead arsenate mixture for grub-proofing" turf

developed for handling or treating most of the types of nursery stock grown in the infested area, so that they may be shipped in compliance with quarantine requirements without risk of further dispersing the beetle. Measures have been perfected for treating or otherwise handling those farm, garden, or orchard products likely to carry infestation. A trap capable of catching large numbers of beetles has been developed, using as a bait a mixture containing oil of geraniol, which was found to be especially attractive

to the beetle. Constant effort is being made both to improve those methods of treatment already devised and to develop new and better measures.

C. H. HADLEY, Bureau of Entomology.

AMB Becomes More Tender When Ripened By Period of Storage Ripening meat consists in hanging the fresh, chilled carcasses or cuts in cold storage for a period of days or weeks. Temperatures are held at about 36° F.,

and the relative humidity is kept fairly low so that the surface of the meat will remain dry. Consumers of beef long ago decided that ripening increases its tenderness and improves its flavor. As a result a considerable quantity of commercial beef is held in cold storage for from two to six weeks before delivery to the retail stores whose trade desires this ripened meat. Ribs, loins, and hind quarters of high-grade, well-fattened cattle are best adapted to ripening or aging.

Pork consumers, on the other hand, have indicated a definite preference for chops, loin roasts, and fresh hams that have not been ripened.

These market preferences for ripened beef and freshly chilled pork are in contrast with the lamb situation, in which no definite choice exists. Lamb is moved into the retail trade as promptly as possible to prevent a storage shrink in weight, but normally neither premium nor discount is made because of the length of that storage period. The few customers who desire their chops as soon as the carcass has been chilled about offset the few who ask that a hind quarter be "hung back" for ripening.

In connection with the meat-research program conducted by the Bureaus of Animal Industry, Home Economics, and Agricultural Economics, of the Department of Agriculture, together with 26 State agricultural experiment stations and several other livestock and meat agencies, legs from several hundred lambs have been roasted annually in recent years and tested for tenderness, flavor, and other factors of palatability. Some of these legs were cooked and sampled within two days after the lambs were slaughtered. Others, forced to wait their turn in the cooking laboratory, were held in cold storage for varying periods up to 25 days.

# Large Quantity of Data Summarized

The palatability records of 1,222 of these legs have been summarized to study the effect of ripening upon the tenderness of the meat. Comparisons were made to see whether the consumer would obtain a more desirable product from lamb that was freshly chilled or from

lamb that had been ripened for a definite length of time.

The 1,222 legs used in this summary came from 1,222 different lambs. In contrast to subsequent tests, described later, of pairs of legs, the selection of the legs in this part of the experiment was on a strictly random basis. Almost every age, breed, grade, and feeding method were represented and groups of the legs were cooked after varying periods of storage, as shown in the graphs. The number of lambs is so large that the summary of their tenderness records should show the effect of ripening upon the eating quality of the meat in spite of variations due to other causes.

All these 1,222 legs of lamb were cooked and sampled under as nearly the same conditions as could be maintained, according to the directions given in the project outline of cooperative meat investigations. Every leg was roasted skin side down and cut flesh side up in an open pan on a rack, without seasoning, without added water, and with the fell left on. Every leg was seared for 20 minutes in a very hot oven averaging about 510° F. (265° C.) then finished very slowly at 257° F. (125° C.), until a meat thermometer kept in the thick portion of the leg reached

169° F. (76° C.). Each was carved while hot.

A committee of four or five experienced judges ate slices from the inside muscle of the leg (semimembranosus) for the purpose of describing its aroma, flavor, juiciness, and tenderness. The judges used the cooked-meat grading chart adopted for the cooperative meat investigations project. After thoroughly chewing the meat, each judge graded its tenderness by one of the following word descriptions: Extremely tough, very tough, tough, slightly tough, moderately tender, tender, very tender. These word descriptions are a means of placing each leg of lamb on a 7-point scale of tenderness between the extremes of tenderness and toughness. Slightly tough may be looked upon as a mid-point, or average, of the total range between extremely tough and very tender. For convenience in averaging the tenderness grades given to a leg of lamb by several judges, numbers from 1 to 7 have been arbitrarily assigned to the word descriptions. By this system each leg of lamb receives a numerical measure of tenderness, or score, which is the average of the opinions of several judges.

# Mechanical as Well as Chewing Test Used

In addition to the chewing test as a measure of tenderness, there was also a mechanical test. Samples taken from the inside and outside muscles of the leg (semimembranosus and biceps femoris, respectively) were tested for resistance to shearing by a specially designed instrument which registered in pounds the force required to shear through the meat sample. For brevity, the observation was recorded as "shearing strength." Low tenderness scores given by the judges are associated with high resistance to shearing and high tenderness scores are associated with low resistance to shearing.

The tenderness records of the 1,222 lamb legs were averaged in groups for each day for from 2 to 10 days after slaughter, and thereafter for 5-day intervals. The data for judges' scores and shearing strength are

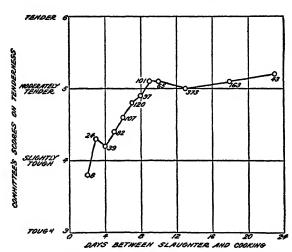


FIGURE 83.—Effect of ripening on tenderness of 1,222 cooked lamb leg-, as determined by judges' scores Figures at points on curve show number of lambs tested

shown graphically in Figures 83 and 84. During the first 10 days of storage the meat increased in tenderness on the average from slightly tough to moderately tender, or over one grade, as indicated by the judges' scores. After 10 days the meat continued to be moderately tender, with slight fluctuations up and down. This same general trend was recorded by the mechanical test.

Since the methods of grading and testing meat for tenderness used in these lamb

studies were new, additional tests were made to check these methods and to determine whether they would accurately compare the variations in palatability. Forty-eight pairs of legs of lamb were used in such tests. Corresponding lefts and rights from the same carcasses were cooked and tested on the same day to see whether the committee and the tenderness machine could give comparable reports on meat that was similar. The results both by judges and by mechanical tests revealed no significant difference between the average tenderness of the 48 left legs and that of the corresponding 48 right legs. Not only were averages similar but variations for one particular leg were also observed in the committee gradings and tenderness test of its mate.

#### Methods of Testing Found to be Reliable

In view of these results it appeared that the methods used were showing the differences in the meat and that, on the average, ripening actually did improve the tenderness of lamb as shown by the preceding summary of the 1,222 legs.

To check this still further a special experiment was conducted in which the left legs from 60 lambs were cooked and tested within 2 to 6 days after slaughter and the corresponding right legs were held 12 to 21 days after slaughter before being cooked and tested by the same method. The data made possible a study of effects produced by ripening periods of different lengths for the same kind of meat. Of 60 legs stored for the longer periods, only 3 were less tender than their mates stored for shorter periods and these differences were small. The results obtained confirm those indicated by the 1,222 individual samples, shown in Figures 83 and 84.

The combined results show that, on the average, lamb legs become more tender if held in cold storage for from 7 to 10 days after slaughter. Tenderness changes but slightly during the next 10 days, and the me-

chanical test showed a small decrease in tenderness beyond 20 days of ripening.

Of special interest is the fact that the meat from individual lambs ripened the same number of days varied widely as to tenderness. From the group of 1,222 left legs of lamb and the 60 pairs of legs, of those stored for 3 days, the meat ranged from very tough to tender; for 10 days it ranged from tough to very tender, and for the 16 to 20 day interval from slightly tough to tender. These individual ranges serve to ex-

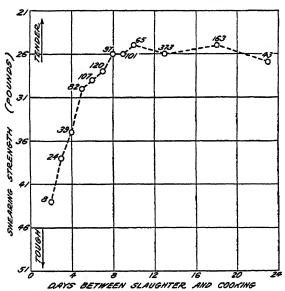


FIGURE 84 — Effect of ripening on tenderness of 1,222 cooked lamb legs, as determined by mechanical test—Figures at points on curve show number of lambs tested

plain why the average differences in tenderness resulting from storage for varying intervals are not greater than they appear in Figures 83 and 84.

Of special concern to lamb producers is the observation that "green" meat from some lambs was tender and fully ripened meat from others was not. In other words, some of the lambs possessed a natural tenderness that was lacking in the others. There seems to be a real opportunity for the lamb industry to improve its product by research that would discover and develop the blood lines and management methods that produce the more desirable product.

K. F. WARNER, Bureau of Animal Industry.
LUCY M. ALEXANDER,
Bureau of Home Economics and Bureau of Animal Industry.

AMB Grading at Point of Origin Compensates Producer for Quality With the growth and development of agricultural extension and educational facilities, the wide distribution of economic and market information, and the

cooperative movement, a greater appreciation of quality in agricultural commodities and products has developed among the farmers throughout the United States. Until a few years ago (and in many States and communities even at the present time), it was a common practice among sheep raisers to sell their lambs at the farm for a flat price per head or per hundredweight. This system of selling presumes that all lambs in a flock are quite similar in such characteristics as conformation, finish, and quality and should therefore sell for the same price.

The realization among sheepmen that all lambs have not the same characteristics has been largely responsible for the development of a system of marketing whereby lambs are assembled in the country at a concentration or shipping point and sorted into grades having similar characteristics, then sold upon this basis either at the concentration point or after being shipped to a central livestock market. This system of marketing does not suppose that graded bands of lambs will net more money than they would if a buyer were to pay a flat rate per hundredweight for the same band of lambs. If sold according to grade there would be a wide range between the price paid for the lambs of high grade and that paid for those of low grade. If, however, they were sold at a flat price per hundredweight, the price received would be between that paid for high and low grade lambs, depending upon the buyer's estimate of each grade represented in the band of lambs. Should this band of lambs belong to one producer, the importance of grading might not be so great. However, in the farm-flock States, producers do not have lambs in sufficient numbers to make individual shipments to market. It is necessary that several producers pool their market lambs in order to effect economies in shipping expenses.

In pooling lambs for shipment it is obvious that lambs from different flocks are not similar in such characteristics as conformation, finish, and quality. Lambs from the same flock differ in these respects. Yet, the producer marketing Choice grade lambs receives the same price as the producer marketing Medium grade lambs, under the flat price per hundredweight method of buying and selling. This method of dealing violates the principle of selling lambs on their merit, since it causes high-grade lambs to sell below the prices that could be obtained if they were sold separately from the lower grades, and it destroys much of the incentive to produce lambs of superior quality. Under a system of marketing by which the lambs are graded at the point of origin these

inequalities in price are avoided.

Marketing lambs by grade has been practiced rather extensively for several years in Missouri, Kentucky, and Tennessee. The enthusiasm of sheep producers for this method of marketing, and its growth, are the best evidence that it is sound and practical. Grading lambs at country assembly points has a great many educational features that are proving beneficial. It enables producers to learn the standards for the different grades of lambs. It clearly demonstrates that breeding, feeding, and management are factors involved in producing the highest grades of lambs. It creates a desire among sheepmen to produce better lambs because of the higher price which they command, and finally it provides ample proof that a painstaking shepherd is well rewarded for his efforts.

M. T. Foster, Bureau of Agricultural Economics.

ESSER Peach Borer Killed with Paradichlorobenzene Dissolved in Cottonseed Oil The lesser peach over his been regarded as an important peach insect for at least 25 years, and during recent years it has caused

much damage to some peach orchards. The insert has a decided preference for peach trees, which are its favored hosts, although other known food plants are plums and cherries (both cultivated and wild), the black-knot fungus on plum and cherry. Joneberry, beach plum, and chestnut

This borer invariably works in areas on the trunks or limbs of peach trees that have been injured by implements, harness chains, low temperatures, cankers, or sun scald, and in crotches or under loose bark of old trees. Frequently it is found working around a pruning wound which has failed to heal properly. Orchards that have been somewhat neglected or those in which there are injured or diseased trees are the most subject to attack. Injury is due to the destruction of the cambium and inner-bark layers by the feeding of the larvæ, and usually a considerable quantity of gum is found evuding from infested areas. In severe cases limbs may be entirely girdled and killed, or the trunk may be honeycombed by the work of the larvæ, and in practically all cases the trees are weakened. Injury is confined largely to old trees, since the larvæ apparently prefer to work in areas where the bark has been injured in various ways, and at old crotches.

Frequently the lesser peach borer has been confused with a some-what larger species known simply as the peach borer. This confusion is not surprising, for the two insects are closely related and are much alike in both the larval and adult stages. They are two entirely distinct pests, however, and work in different parts of the tree, the lesser borer confining its attack to the limbs and upper trunk whereas the larger borer attacks the trunk at and below the soil level and is sometimes found working in the large roots.

#### Former Method of Control

The use of paradichlorobenzene crystals is now a well-established means of controlling the peach borer, but the only control hitherto for the lesser peach borer has been to cut the larvæ out of their burrows with a knife. Hand worning is unsatisfactory, and since the trees are seldom killed by the attacks of the lesser borer, even this measure has not been generally practiced. Consequently, heavy infestations, expecially in old orchards, are not uncommon. The lack of a good method of controlling this important peach insect attracted the writer's interest in 1924. Observations and experiments were therefore started in that year and have been continued until recently when, as a result of these investigations, paradichlorobenzene dissolved in crude cottonseed oil was announced as an effective and practical remedy for the insect.

#### Method of Treatment

This new insecticide, which the Department of Agriculture is now recommending for the control of the lesser peach borer, should be used in the proportion of 1 pound of paradichlorobenzene crystals to 2 quarts of crude cottonseed oil. Oil from any southern cotton-oil mill will be satisfactory for making the insecticide. In cool weather the oil may have to be warmed before all the crystals will dissolve, and some recrystallization may take place if the insecticide is stored

during cool weather; however, the crystals will dissolve again when warm weather returns. The container should be tightly stoppered if stored, to prevent the loss of the active ingredient.

The insecticide should be applied to the infested areas with a paint brush (Fig 85) Treatment should extend for a few inches beyond



Figure 55—Peach trees being treated with paradichlorobenzene dissolved in cottonseed oil for control of the lesser peach borer

the edges of borer indications, and the areas should be thoroughly soaked with the insecticide. Only infested areas should be treated. The insecticide should not be used over the entire trunk or on whole limbs, or on healthy tissue at places other than on the borders of infested areas. It should be applied either in the fall or spring. Fall applications have an advantage over those made in the spring in that they kill the borers before they are full grown and prevent their working in the trees during the fall and the warm periods of the winter. On the

other hand, the results of experiments indicate that the percentage of borers killed by applications in April is a little higher than by those made in October. It is not necessary to remove the gum, frass, or loose bark from infested areas before applying the wash

OLIVER I. SNAPP, Bureau of Entomology.

OGS from the Wood Lot May Be Sold Profitably on a Log-Grade Basis

Small timberland owners are at a disadvantage in selling their logs, because they usually have only a general idea of the comparative value of the different

classes of logs. When a farmer delivers logs to a mill yard he frequently bases his selling price on his labor cost plus a charge for the timber, which practically ignores the value of the stumpage. His price should equal the difference between the value of the lumber produced and the production costs of the sawmill operator plus a fair profit for manufacturing.

Selling on a log-grade basis should be advantageous to both the farmer and the sawmill operator. While the inferior logs would bring very little, larger and better logs would bring considerably more. Consequently it would generally be more profitable to save smaller trees for a more profitable cut later on, or to cut smaller trees into

poles, fuel, or pulpwood.

The value of logs depends not only on size but also on the amount of defect. The amount of defect has a marked influence on the amount of lumber produced, but little on its quality. Therefore no correction is necessary if the logs are sold on a net scale basis. If, however, they are sold on a gross scale basis, a percentage reduction on their value equal

to the percentage of defect should be made.

One of the greatest obstacles in the way of selling logs on a grade basis is the fact that there are no standard log grades. In the absence of log grades and with the hope of partially overcoming these obstacles, the following simple quality classification for logs, based largely on the position they occupied in the tree, is offered: (1) Butt logs, (2) smooth logs, and (3) top logs. The first would include all butt logs 10 inches or larger, free from limbs or knots. The second would include all other logs 8 inches or larger that contain not more than one knot on the surface for every 4 feet in length of the log. The third would include all the other logs. They would be relatively coarse and knotty, and usually the top logs of the trees.

# Grades Applied at a Southern Mill

The application of these grades was tried out by the Forest Products Laboratory at a southern mill cutting second-growth loblolly pine. Based on 1928 costs and values the operator could make a fair profit by paying \$14.26 for butt logs, \$7.08 for smooth logs, and \$2.50 for knotty logs per thousand board feet, Doyle scale, with 3.5 per cent deduction for defects. Based on the percentage of the different types of logs brought to the mill the flat rate would have to be \$9.71 per thousand, Doyle scale, to yield the same return to the farmer on his timber. If the farmer could dispose of his knotty logs elsewhere, the buyer could afford to pay \$10.60 for butt and smooth logs. The figures quoted should only be used as a guide, for local conditions might lower or increase these figures considerably. For example, the price of pine logs sold at the mills in Arkansas as given by United States Department of Agriculture Statistical Bulletin No. 32 gives an average price of \$10.43 with the individual sales varying from \$8 to \$18.

The spread in value indicated above between butt logs, smooth logs, and knotty logs holds fairly well in other species also. In northern red oak, for example, with a 12.5 per cent deduction for defects, butt logs are worth \$27.90, smooth logs \$18.30, and knotty logs \$12.50; and in sugar maple with a 5.3 per cent deduction for defects the butt logs are

worth \$21 and the other logs about \$11.20.

Some appreciation of difference in log qualities will help the small wood-lot owner to obtain a fairer price for his timber, but he must not forget to find out before he cuts his timber what the buyer will pay, what size and length he will accept, and how defective the logs may be.

RAY MILLER, Forest Products Laboratory.

EAT Prices at Retail Follow the Trend of the Livestock Market

During 1931, when prices of all agricultural commodities were falling rapidly, the Department of Agriculture received many inquiries as to whether

the lower prices received by livestock producers were being reflected in retail meat prices. In response to these many inquiries, the department analyzed retail meat prices at New York City. The assembling of adequate and comprehensive data on retail meat prices to present a true picture of the retail market throughout the country is a difficult task, since meats vary widely in grade and are sold in various styles of cuts in thousands of stores with different kinds of customer service. This report, therefore, deals with only one grade of carcasses sold at New York by stores on a cash-and-carry basis with some delivery and credit service.

The retail meat prices were collected twice a month from the retailers and the mean of the range of the quotations as reported for each cut was computed and used as the average price for that particular retail cut. In the case of beef, prices were collected on the six more important cuts, i. e., porterhouse, sirloin, and round steaks, and rib roasts, chuck roasts, and plate beef; for lamb, prices are for the leg, loin, and rib chops and stew meat. In neither case do the above cuts comprise the entire carcass, consequently prices were calculated for the remaining cuts, i. e., flank, blade rib roast, brisket and shoulder of beef, and square chuck of lamb, by using a retail price differential more or less common to the New York retail market.

# Method Used in the Analysis

The prices for the 10 cuts of beef were then used for computing a weighted composite retail price per pound of the total salable beef in a carcass, making allowance for the usual trimming and boning done by the retailer. Based on numerous tests in which cuts were given a fairly close trim, the salable beef represented about 79.75 per cent of the carcass weight, the remaining 20.25 per cent represented shrinkage, fat, and bone trimmings. The same procedure was followed in computing the composite retail price of lamb, and in this case, the sal-

able portions equal 97.5 per cent of the carcass weight.

Having the composite or average retail price of cuts from a Good grade steer carcass, based upon the semimonthly and monthly retail price quotations, the total retail value of a carcass was computed. The packers have given an average dressing percentage of 58 per cent to Good grade steers; thus a 1,000-pound steer will produce a carcass weighing 580 pounds, and from this carcass the retailer will be able to sell 462.5 pounds of trimmed retail cuts. Multiplying this weight, 462 5 pounds by the composite retail price, gives the total value of the retail cuts from a 1,000-pound live steer. To determine whether or not the price reduction of the live animal is reflected in the retail prices, it is necessary to compare the total value of the live steer with the total value of the retail cuts, because the prices of some individual cuts react just the opposite to the live steer market or the wholesale meat market at certain seasons of the year. Without taking into consideration the prices of all cuts from a carcass, the retail prices of only a few cuts may be very misleading and a true condition of the retail market can not be visualized from them.

#### Basis for Steer Values

In computing the value of a 1,000-pound Good grade steer, the average monthly quotations of the Chicago market were used, whereas the value of the 580-pound Good grade steer carcass was based upon the average monthly quotations of the New York wholesale meat mar-

ket, and the retail value was based upon the composite retail price computed from the retail quotations at New York. In the case of lamb, the same procedure was used except that the carcasses were taken as 48 per cent of the live animal, thus giving 480 pounds for each 1,000 pounds live weight, and 468 pounds as the weight of the trimmed retail cuts.

The accompanying charts (figs. 86 and 87) illustrate the monthly fluctuations in the value of the live animal, carcass, and retail cuts for

the years 1929 to 1931.

The average value of a live steer for 1929 was \$140.30, and for a carcass, \$125.40, whereas the retail cuts gave a gross return to the retailer of \$188.47, in comparison with returns during the first 10 months of 1931, when a steer realized \$89.80, or a reduction of \$50.50; carcasses

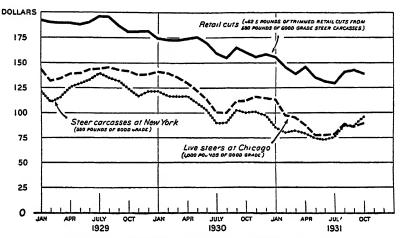


FIGURE 86 - Total value of live beef steers, carcasses, and retail cuts

\$81.20 or a drop of \$44.20; and the retail cuts \$141, a decrease of \$47.47. Comparing returns in 1930 with those in 1931, steers declined \$30.20, carcasses \$24.10, and retail cuts \$25. In both cases there is evidence that the reductions that the packer allowed the retailer were passed on to the consumer. The reductions that took place on the live animal appear not to have been applied entirely to the carcass, consequently the reductions for the live animal and for the retail cuts are not comparable.

Margins Remain About Constant

The margins or the differences between the carcass value and retail value seem to remain about constant with some seasonal variations and a slight lag at times because of the lack of immediate changes by the retailer in reflecting the carcass changes in the retail cut value. There also appears to have been a general trend on the part of the retailer to narrow the margin during 1931 as compared with the margins the two previous years.

When considering lamb for the years 1929 and 1931, similar facts are observed. A comparison of figures for 1929 with those for 1931 shows a decrease in value of 1,000 pounds of live lamb of Good grade from \$143.60 to \$75.10, a decline of \$68.50. Carcasses of this same grade

declined from \$131.20 to \$81, or \$50.20, whereas the retail value dropped from \$182 to \$121.10, a decline of \$60.90. Thus the retailers were allowed a reduction of \$50.20 on the carcasses but lowered the value of the trimmed retail cuts by \$60.90, apparently allowing the consumers a greater saving than that to the retailers by packers. For the years 1930-31 live lambs per 1,000 pounds had a reduction of \$21.40, carcasses were reduced \$18.60 for every 480 pounds, whereas the value of the 468 pounds of retail cuts was reduced \$24.30.

The data presented here in chart form show that in general the value declines in the cattle and lamb markets in the last three years have been reflected in the wholesale meat market, although not completely so, because the value of the by-products have also been reduced and these outlets have absorbed part of the livestock value reductions.

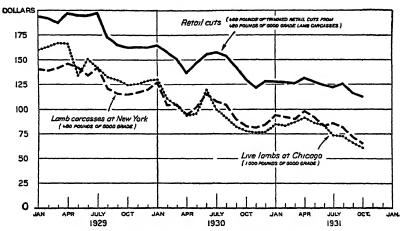


FIGURE 87 - Total value of live lambs, carcases, and retail cuts

Although there is a tendency for the retail meat values to change more slowly than the carcass values, the reductions given by the packer are eventually passed on to the meat consumer.

A. T. Edinger, Bureau of Agricultural Economics.

EXICAN Bean Beetle Approaches Northern Limits of Distribution Ten years after its discovery in the eastern part of the United States the Mexican bean beetle has apparently approached the northern limits of its

distribution, at least from an economic standpoint. The new territory invaded during 1930 was relatively small, as indicated in the accompanying map. (Fig. 88.) No new States were reached and new records of distribution were obtained from only five States—South Carolina, Connecticut, Massachusetts, New York, and Michigan—the newly infested areas in the last two States being very small. During 1931 two new States, Vermont and Rhode Island, have been invaded, and some new territory has been infested in Indiana, Kentucky, and Georgia.

It is probable that the severe drought of 1930 may have retarded spread toward Illinois and farther into the lower peninsula of Michigan. However, Massachusetts, Connecticut, and New York were not se severely affected by the drought and it is believed that the spread

there was normal. It is significant that for several years the beetle has not appreciably increased its range nor become more abundant along the northern limits of distribution, except in New England, and there essentially to the east rather than to the north.

# Conditions in the Southern Range

On the other hand, in the more southern range in the Eastern States along, relatively mild autumn prevailed and the beetle completed a brood after the late summer rains. The winter of 1930-31 was favorable to its hibernation, with the result that the percentage of survival was above the average in Ohio and New York and possibly in other States. At Columbus, Ohio, the winter survival was over 5 per cent and at Athens, Ohio, over 8

per cent, which is the highest of record. At the Arlington Experiment Farm, Va., the survival was over 18 per cent, as compared with 33 per cent in 1930 and 62 per cent in 1929, while at Norfolk, Va., the survival was almost average for that area, approximately 50 per cent. At Geneva, N. Y., only 1.42 per cent survived the winter, but this is relatively high as compared with less than 0.1 per cent in 1930.

In general, fewer beetles than usual entered hibernation during the fall of 1930 owing to the effects of the drought, and the spring infestations were not so heavy.

FIGURE 88 —Spread of the Mexican bean beetle in the Eastern States from 1920 to 1931

The remarkable recuperative ability of the beetle was evident in Ohio, Tennessee, Alabama, North Carolina, New Jersey, and Long Island. In these areas considerable damage was done early in the summer and control measures were necessary.

The experimental work on the control of the beetle has been continued and results indicate that spraying with magnesium arsenate

gives the best protection to beans from damage by this pest.

This spray requires 2 pounds of magnesium arsenate per 100 gallons of water. It is necessary to use about 100 gallons of spray per acre. Ordinarily four applications, prior to the setting of the pods, will control the beetle. Spraying with an arsenical after the pods are set is not recommended.

NEALE F. HOWARD, Bureau of Entomology.

ILK and Cream Imports Raised in Quality by Federal-Control Law The Federal import milk act is designed to regulate the importation of milk and cream into the United States for the purpose of promoting

the domestic dairy industry and for the protection of public health. The act was passed by the Sixty-ninth Congress of the United States, approved February 15, 1927, and became effective 90 days latter. Following its enactment, it became necessary to institute a program of milk control that would bring all imported milk and cream within the provisions of the law. The standard as set forth requires: (1) That all cows producing milk or cream for importation into this country must be healthy, as determined by the tuberculin test and by physical examination at regular intervals by duly authorized veterinarians; (2) the sanitary conditions of dairy farms and plants producing milk or cream intended for shipment into the United States must be such as to score at least 50 points out of 100 points, according to the scoring methods prescribed by the Bureau of Dairy Industry; (3) certain definite bacterial limitations must be met by the producer of milk and cream before he can legally offer his product for entry; and (4) the temperature of the milk or cream at time of importation must not exceed 50° F.

Before milk or cream is offered for entry the shipper must hold a valid permit. The Secretary of Agriculture was given authority, under the law, to issue temporary permits to shippers pending completion of arrangements for the necessary inspections at source, and examination at ports of entry, to determine that all the provisions of the act had

been met by the importer.

Active enforcement of the measure did not begin until the spring of 1928 and by June of that year a complete program of operation was being carried into effect. The Food and Drug Administration is charged with the responsibility of enforcing this law. Enforcement is centered in a station at Rouses Point, N. Y., since practically all importations of milk and cream originate in the adjacent Canadian Provinces. The enforcing agency consists of a station chief, a force of veterinarians, bacteriologists, clerks, and laboratory assistants.

# Farms Inspected in Canada

Veterinarians of the Federal and Canadian Governments are constantly traveling through producing sections of Canada inspecting dairy farms and receiving plants to see that all sanitary requirements are fully complied with. Physical examinations of all cows producing milk or cream for United States delivery are made at regular intervals to detect the presence of disease and to exclude unhealthy animals from such milking herds.

Federal bacteriologists examine samples of milk and cream collected by the inspectors at the various ports of entry. These examinations are made by the standard plate count, authorized by the American Public Health Association, for determining the number of living bacteria per cubic centimeter. The standards as prescribed in the act demand that there shall be not more than 300,000 bacteria per cubic centimeter in raw milk, 750,000 in raw cream, 100,000 in pasteurized milk, and 500,000 in pasteurized cream.

An important development of the past year has been the removal of cows with diseased udders from milking herds. This was facilitated through the issuance by the Dominion veterinary director general of an order, October 21, 1929, to the effect that no Canadian herd would be approved for American trade in which there were animals suffering

from mastitis or other functional diseases of the udder.

As a result of the enforcement of the import milk act, milk and cream coming from Canadian sources to-day are of good quality, the product of healthy cows as determined by strict veterinary supervision and bacteriological analyses. The milk and cream not only come from healthy herds and are produced under improved sanitary conditions, but all of the product is effectively pasteurized and transported, as shown by the inspections made under Federal control.

H. B. SWITZER, Food and Drug Administration.

# INERAL Mixtures for Livestock Misbranded if Claims Are Excessive

Within the last few years, there has been an unmistakable tendency on the part of certain manufacturers of mineral mixtures to make many

unwarranted claims for their products. This has been particularly noticeable in collateral advertising and in claims made by salesmen selling products from farm to farm. The claims vary, but they usually give the impression that the feeding of mineral mixtures to farm livestock, including poultry, will cure or prevent serious infectious diseases, prevent or control worm infestation, expel worms, purify the blood, prevent bloating and digestive disturbances, cleanse the intestinal tract, and increase egg, milk, and meat production.

The Food and Drug Administration considers mineral preparations actually labeled in this manner as misbranded under the Federal food and drugs act and is instituting vigorous action to prevent interstate

trade in such mislabeled products.

Adding to the feed of animals certain inorganic or mineral substances, such as calcium, phosphorus, sodium, potassium, chlorine, and small amounts of iodine, iron, and copper, may supply elements deficient in the ordinary ration. The use of such products will not, however, create a resistance against contagious or infectious diseases, nor is there a sound reason to believe that the feeding of minerals is effective in the treatment of such diseases.

The restoration of a proper balance in a mineral-deficient ration through the addition of certain needed minerals may result in normal egg, milk, or meat production when decreased yields are due to a shortage of minerals in the feed. Decreased yields, however, may be due to many other factors, such as poor environment, feeds deficient in vitamins or other food substances, or chronic infectious and parasitic diseases. The Food and Drug Administration, therefore, believes that claims that the use of minerals will stimulate the production of milk, eggs, and meat, create an erroneous impression in the mind of the buyer.

Many preparations containing quantities of soft coal have been widely advertised as having value in controlling worm infestation in hogs. Veterinary studies have shown that neither coal, nor any other mineral substance administered in the feed, has proved efficacious in the control of any type of worms infesting hogs or any other animal. While coal or charcoal appears to be highly palatable to pigs, neither has striking food value nor any recognized therapeutic value.

# A Self-Limiting Disease

The disease known as necro, or necrotic enteritis of swine, according to veterinary investigators, is more or less self-limiting in nature. Given proper sanitary precautions, spontaneous recoveries are not unusual in the early stages of the disease. In view of this fact, many manufacturers of mineral mixtures have attempted to create in the minds of hog raisers, through claims on labels or in advertising, the impression that minerals are very effective in the prevention and treatment of this disease. Such assertions are at variance with sound scientific facts. As a matter of fact, the use of inorganic minerals in the treatment of this disease may actually aggravate the condition, since the mucous membrane of the intestinal tract is highly inflamed, due to the irritation set up by the causative factor of the disease.

The Food and Drug Administration has investigated many products of this type and, in the enforcement of the law, has removed many from the market. However, the administration can, under the law, exercise control only over curative claims made on the labels of feeds and drugs shipped in interstate commerce or in the circulars accompanying such goods. Legal control does not extend to curative or preventive claims made in outside advertising—on billboards, in newspapers, farm papers, and other periodicals. It is suggested that the prospective buyer compare these representations with the state-

ments printed on the labels themselves.

H. E. Moskey, Food and Drug Administration.

FFICIAL Grading Service for Canned Fruits and Vegetables Inaugurated

For the first time the canning industry is being afforded an official canned fruit and vegetable grading service by the Federal

Government. The industry has struggled for years with the problem of grading, but there was not an official service until an appropriation

became available for it July 1, 1931.

Previous appropriation acts authorized inspection and grading services on fresh fruits and vegetables, poultry, dairy products, and certain other farm products. The appropriation act approved February 23, 1931, broadened the authority of the Department of Agriculture by changing the language to read "fruits and vegetables, whether dry, raw, or canned," and made available a small appropriation with which to inaugurate the service. Included in the item, as usual, is the further authority to "charge such fees as will be reasonable for services rendered and will as nearly as possible cover the cost for the service rendered."

Much study has been given to the subject of grading canned foods by the Bureau of Agricultural Economics in connection with the administration of the United States warehouse act. Various sections of the canning industry have cooperated with the bureau in an endeavor to formulate practicable grades with which the various qualities of canned foods might be evaluated and catalogued. With the cooperation of the industry, grades for several canned vegetables were promulgated under the authority of the United States warehouse act. Slight revisions in the grades are being made as they appear

necessary and are being promulgated under the farm products grading law. These grades form the basis for the establishment of the new grading service.

# Interested Parties May Request Grading

Under the regulations of the Secretary of Agriculture governing the service, any party financially interested in a given lot of canned fruits and vegetables may request that the goods be graded. Grading offices are being located at convenient points throughout the United States. The applicant may request the representatives of the department to draw the samples from the lots to be graded; the samples may be drawn by a licensed sampler; or he may submit the samples himself. In any event, the certificate of grade reflects the grade of the samples drawn. Fees are collected for each lot graded, based on the size of the lot from which samples are drawn. Since the certificate is "admissible in all courts of the United States as prima facie evidence of the truth of the statements therein contained," its value as a commercial document in supporting sales is readily appreciated. These certificates become of great importance to bankers or warehousemen who finance stored stocks of canned foods. They form a most satisfactory basis for use in the settlement of disputes which may arise over the quality of merchandise. Some concerns are now quoting their products in the terms of the United States grades and offer to support the delivery of their merchandise with certificates of grade.

The service is being manned by experienced men, all of whom are full-time employees of the Bureau of Agricultural Economics. The

graders are carefully trained before taking up their duties.

Grading service is being carried on at Philadelphia; Chicago; Washington; Louisville; and Tulsa, Okla. A temporary field office was operated during August, September, and October, 1931, at Easton, Md. Applicants, however, may request that samples be drawn by any of the farm-products inspectors in the 50 stations in the principal markets of the country. The inspectors will, in turn, submit the samples to the proper grading office for certification. Temporary field offices may be located in the more important producing areas throughout the United States.

# Heavy Demand from the Start

Although the service was not available until early in August, a very heavy volume of work was offered. Several Government departments requested the grading of samples of merchandise submitted to them in support of bids for their business, and requested grading of the merchandise upon delivery. The volume of grading for Government institutions alone has been quite heavy. The requests for commercial inspections from warehousemen, canners, buyers, etc., although the canning season was far advanced before the work was well under way, taxed the offices of the new project to their capacity.

Official grades are now available for canned peas, canned corn, both whole grain and cream styles, and canned tomatoes. Tentative grades have been drafted and are in use for canned beets, spinach, and mustard greens, Lima beans, snap (or string) beans, and sauerkraut. Studies are being carried on in connection with grades for additional

canned vegetables as well as fruits.

Paul M. Williams, Bureau of Agricultural Economics.

RANGE Refrigeration in Ocean Transport is Best When Fruit is Precooled

Valencia oranges are exported in large quantities to England from California. To study the conditions affecting the refrigeration of the fruit

in transit and the consequent effect on decay, representatives of the United States Department of Agriculture have accompanied a number of shipments from Los Angeles to English ports. Electrical thermometer equipment installed in the holds of ships made it possible to follow changes in fruit and air temperatures during the 28 to 33 days in transit.

Data accumulated and observations made show that the principal factors reducing the efficiency of refrigeration are (1) high temperatures of fruit at time of loading, (2) inadequate circulation of refrigerated air through the load aboard ship, (3) the customary use of air that is not sufficiently refrigerated, and (4) the reduction in the refrigerating capacity of the ship on account of the high temperature of the sea water encountered.

The peak movement of oranges for export occurs during the summer, when the temperature of the fruit may range as high as 80° F. If the fruit is shipped to the docks in iced cars, the temperature can be reduced 10 to 15 degrees, but the greatest temperature reduction is obtained by precooling the fruit at the packing house. The benefits of this initial cooling are readily apparent when it is considered that most of the available ships are not equipped to reduce the temperature of warm fruit in large holds more than 10 to 25 degrees during the first eight days of a voyage.

# Air Circulation Aids Refrigeration

Circulation of air in fruit compartments increases the effectiveness of the refrigeration. The cold air enters at one side of the compartment and leaves at the opposite side after passing freely over the load and under the floor racks, and less freely through the load between the layers of boxes. The rate of movement of refrigerated air was found to have a very important bearing upon its effectiveness in cooling the fruit. Fifty changes of air per hour cooled the fruit in shallow compartments more uniformly and more rapidly than 30 changes per hour; reversing its direction every 12 hours likewise added to the effectiveness of the

refrigeration.

The large lower holds are often 18 to 20 feet deep. The rate of cooling in them was found to be considerably slower than in the smaller shallow compartments. In some cases it was observed that much of the fruit in these large holds remained warm for two to three weeks; that is, for 50 per cent or more of its transit period. On account of the size and shape of these holds a much smaller proportion of the fruit is exposed to the free movement of refrigerated air over and under the stacks of boxes than in the smaller holds. In these holds over 50 per cent of the fruit is usually placed so that any cooling must come from refrigerated air traveling through the load. This is particularly serious if air circulation is not forced, as in the case of refrigeration from brine coils or from direct expansion pipes hung on the walls and ceilings of the holds.

Increasing the air space between the layers of boxes by increasing the thickness of the dunnage was found to permit more rapid and uniform cooling of the fruit. Dunnage 2 inches thick gave more satisfactory

results than that only 1 inch thick.

The customary shipping temperature for oranges has been 40° F., but a comparison of the outturn of fruit carried at this temperature and of similar lots carried at 33° to 36° proved that the lower tempera-

tures were preferable.

It was found that precooled fruit arrives in better condition than fruit loaded warm. With precooled fruit the task of maintaining low fruit temperatures was within the capacity of the refrigerating machinery, even in the lower latitudes near the Panama Canal and in the Gulf Stream, where the efficiency of the machinery was greatly reduced by the necessity of having to use warm sea water to cool the condensers. The high air temperatures encountered in this portion of the voyage also affected the temperature of the load, and it was found desirable to shade the decks of the boat with awnings to reduce the heat transferred into the interior.

W. R. BARGER, Bureau of Plant Industry

RIENTAL Fruit Moth's Partial Control by Its Parasites Is Expected

During the last few years the oriental fruit moth has become one of the most troublesome problems of peach growers in the eastern United States.

It has caused very severe damage to the crop over wide areas, and as yet no generally effective control measures have been devised. Fortunately this insect is heavily parasitized, and in sections where it has been established longest, the increase in the degree of parasitism has been accompanied by a very marked decrease in the quantity of wormy fruit. More than 50 different species of parasites attacking it have been reported from the United States; 10 have been reported in Europe, 7 in Australia, and at least 17 species have been reported from Japan. Most of the parasite species known in any one of these four areas do not normally occur in any of the other three. The parasites of this pest belong for the most part to the well-known families of parasitic Hymenoptera. A few species, relatively less important, belong to the parasitic flies of the family Tachinidæ. Within the area of infestation in the United States species that are regarded as important controls in one peach-growing center may be entirely absent in another.

#### The Possibilities of Control by Parasites

The information already gained from investigations of the parasites of the fruit moth indicates that partial control of this pest by its parasites may reasonably be expected over a large portion of the area at present infested, to the extent of materially reducing the high degree of fruit infestation occurring when parasites are absent or scarce. An example of such a reduction has already been observed in southern New Jersey. During its first years of destructiveness in this area parasitism was low, and the wormy fruit among Elbertas frequently exceeded 50 per cent. During the last five years parasitism has been very heavy, frequently exceeding 90 per cent of the infestation in twigs, and the infestation in Elbertas during the last three years has not usually been more than 10 per cent of the fruit and in some orchards has decreased to 3 per cent. This condition occurs in spite of the fact that there is normally a heavy first and second brood infestation of twigs. It is quite probable that parasites will never completely control this pest, since even under the most favorable conditions there will

always be a few worms escaping parasitic attack, and each worm renders a fruit unmarketable. It is self-evident, however, that a means of control that operates automatically to reduce the damage from 50 per cent to less than 10 per cent is greatly to the advantage of the peach-growing industry.

# Increasing the Effectiveness of Control by Parasites

In considering the relation of parasites to the problem of control of the fruit moth in the United States, it is necessary to decide what might be done to increase the effectiveness of the parasites. Without doubt, one of the most important steps is the search for, and introduction of, foreign parasites to supplement those already here. Particularly, those species should be introduced which will attack the stages of the insect at present least heavily parasitized, notably the egg and cocoon stages, or which will be more effective than any of the natives in certain sections where our own species have shown a lack of heavy parasitism. During the last year five species have been introduced from southern Europe and colonized in the United States. It is too early to tell how many of these will prove valuable. Several other species from Europe are being considered for introduction, as well as the three most important parasites of the fruit moth in the infested

area about Sydney in Australia.

Another possibility is the distribution of indigenous species which have proved valuable in one section of the United States into other sections in which they do not occur as parasites of the fruit moth. A small yellow hymenopterous parasite, called Macrocentrus ancylivora Rohwer, has become very abundant and valuable in orchards in the coastal plain strip from southern Connecticut to southern Virginia. During the last three years large numbers of this parasite have been reared at Moorestown, N. J., and distributed to 160 localities in all the important peach-growing centers east of the Mississippi River in which the parasite was not known to occur. Although it is yet too early to determine the value of this work, the results are highly encouraging. The parasite has been recovered from nearly all the centers in which it has been liberated. In some it has demonstrated its ability to winter over and to increase rapidly until the percentage of parasitism approximates that of the area in New Jersey from which it was distributed. Several colonies of two other indigenous species have been released during the past year in areas in which they do not normally occur. Only one species has yet been found present in all the peach-growing centers This is Macrocentrus delicatus Cress. It parasitizes the fruit moth heavily in some sections, notably in eastern Tennessee, but is of minor importance in others.

A third possibility is the mass rearing and liberation in orchards of large numbers of parasites at such a time as strongly to supplement the normal stock in securing crop protection. The species which most readily lends itself to this treatment is *Trichogramma minutum* Riley, a common egg parasite of the fruit moth. A number of large-scale projects are under way in various sections of the country for the rearing and the liberation of this species against several insect pests. The efforts of the Bureau of Entomology on Trichogramma in relation to the fruit moth are at present confined to an attempt to prove whether any economic value can be obtained from such liberations.

PACKAGE Bees May Be
Used as Pollinating
Agents in Orchards

The use of bees to act as pollinating agents in orchards has received special attention during recent years owing to the fact that in many localities the

supply of wild pollinating insects is not only proving inadequate for the task but is actually diminishing. Among the reasons for such a decrease are clean orcharding practices, the cleaning up of fences and hedgerows, the clearing off of forests, the draining of swamps, and forest fires and floods. The bumblebee is only one example of a useful insect now rarely found in many localities where once it was abundant.

It is fortunate for the orchardist that one of the most efficient pollinating insects is the honeybee. Roughly speaking, this is the only insect available to the orchardist to be used for pollinating purposes when he pleases, where he pleases, and in such quantities as he pleases.

In the past the orchardist has made use of full colonies of bees for his pollinating work. Usually these colonies were rented of some beekeeper or were owned by the orchardist himself. However, many orchardists are interested in bees only for the aid they render in pol-

lination and do not care to go to the extra trouble and expense of managing colonies of bees during the remainder of the year. In many localities it is not feasible to rent colonies from beekeepers. In such cases the "orchard package" should prove of great value.

The orchard package has been a devel-

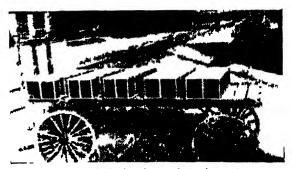


FIGURE 89 -Package bees ready for shipment

opment in the package-bee industry during the last year or two. The package-bee industry first developed in response to the needs of beekeepers for worker bees to strengthen weakened colonies and to establish new colonies. "Package bees," to employ this term in its beekeeping sense, are bees shaken from their original combs into small boxes of light wood and wire screening. These boxes are provided with some device on which the bees may cluster, and with food—usually a can of sirup. Bees may be shipped long distances in such boxes. Package bees are produced chiefly in the Gulf Coast States and in California. For long-distance orders they are commonly shipped by express or mail. (Fig. 89.)

# Orchardist's Task Simple

The orchard package is prepared as described for package bees in general, although some types contain a comb of honey. The chief purpose of most of these types is to provide sufficient food to maintain the bees during the period of pollination, since the bees are to fly directly from the package and are to have a queen. The flight entrance of the orchard package is already corked when the package is received. All the orchardist has to do is to set the package in his orchard just at the beginning of pollinating time and pull the cork to

let the bees out. At times it may be necessary to wrap the package in newspaper, roofing paper, or some similar material to protect the

bees from cold.

The orchard package should contain not less than 3 pounds of bees At least one package per acre should be used. The packages should be scattered separately through the orchard and should not be grouped together. Under favorable weather and floral conditions the bees are at work soon after the orchardist has opened the entrance of the package. When the pollinating season is over he may dispose of these packages to some beekeeper or otherwise.

Information as to where bees can be secured for pollinating purposes may be obtained from State beekeeping associations, State beekeeping officials, or the Division of Bee Culture of the Bureau of Entomology.

W. J. Nolan, Bureau of Entomology.

PASTURE Lands of U.S.
Vary Regionally in
Main Characteristics

In considering the pasture lands of the United States, a study of the native vegetation as it existed before the advent of the white man is very

helpful. According to Shantz and Zon, the native vegetation was originally divided into five main biological communities: (1) From the Atlantic coast to approximately the ninety-fifth meridian, the country was a vast and almost unbroken forest. (2) West of these forests was an area of prairie lands occupied by tall grasses, extending from central Illinois through northern Missouri, Iowa, and western Minnesota to eastern Kansas, Nebraska, South Dakota, and North (3) Immediately west of this was a belt of semiarid, rather level lands bounded on the west by the foothills of the Rocky Mountains and occupied very largely by short grasses. (4) From this line to the Sierra Nevada and Cascade Ranges on the Pacific coast was a vast region occupied by forests, desert grasses, and desert shrubs, the forests being confined chiefly to the higher elevations. (5) The area west of the Sierra Nevada and Cascade Ranges was largely forests in the humid northern part. In the southern part, because of greater aridity, the forests were confined to the immediate coast line and to higher elevations of the mountain ranges, and the interior valleys were occupied very largely by desert shrubs and grasses. The characteristics and productiveness of pastures are correlated to a considerable degree with the original vegetation. (Fig. 90.)

Since the settlement of the Eastern States by Europeans a great part of the forests have been removed through lumbering operations or destroyed by fire. Much of the land thus cleared is now devoted to harvested crops, and of the 359,242,091 acres of crops harvested in the United States in 1929, approximately five-sixths are in the eastern

humid region, which was originally largely forest land.

The fact that forested regions in their natural state are not useful as grazing lands has been established by centuries of experience. Therefore, the only natural pastures in the eastern United States were the prairie grasslands of Illinois, Iowa, and adjoining States. The native grasses in other parts of the eastern United States were of compara-

<sup>&#</sup>x27;SHANTZ, H. L., and ZON, R. GRASSLAND AND DESERT SHEUB. 29 pp., ilks. U. S. Dept. of Agr. Bur. Agr. Econ. Atlas of American Agriculture. Part I. The Physical Basis of Agriculture. Section E, Natural Vegetation. 1924.

tively little value for grazing purposes. Throughout all this region however, excellent pastures have been established by the introduction of foreign grasses and legumes.

# Use of Tame Grasses in Pasture Improvement

The improvement of pastures with tame grasses has been successful only in the eastern humid region and in the humid northern part of the Pacific slope. In the eastern United States the use of tame grasses is limited on the west by rainfall conditions. The rainfall limit for tame grasses at the Canadian boundary is approximately 18 inches; in South Dakota, 21 inches; Nebraska, 25 inches; Kansas, 28 inches; and Oklahoma and Texas, 30 inches In its irregular course from north to

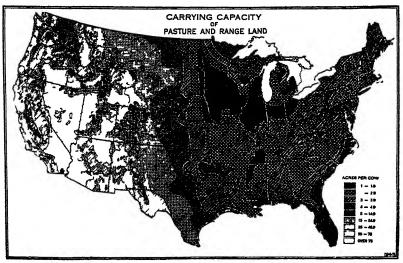


Figure 90 — Map showing carrying capacity of grazing lands in the United States — In the eastern hilf of the country, the map is based on reports from 9,000 farmers as to acres used per cow In general, cows are given supplementary feed, and it is probable that the acreage required per steer without supplementary feed would be more than the amounts shown. The western half of the map outside the national forests was prepared by the Land Classification Board, United States feelogical Survey, and within the national forests by the United States Forest Service. In the Southern States the map represents in general the carrying capacity of improved pasture

south the line of demarcation between the tame-grass and the native-grass pastures begins on the Canadian boundary at 99° west longitude, swings about 2 degrees east of south, and strikes the Gulf coast of Texas at approximately 97° west longitude. (Fig. 91.) The reason for the progressive increase of rainfall required from north to south is of course the interrelation of temperature and rainfall as these forces affect vegetation. The mean annual temperature at the Canadian line is 35° to 40° F.; in Texas it is 65° to 70°. West of this line very few tame grasses succeed until the Pacific slope of the Northwestern States, Oregon and Washington, is reached. In the dry interior between the Sierra Nevada and Cascade Mountains on the west and the western edge of the humid belt, livestock are almost wholly dependent upon native forage plants, except for very limited acreages of irrigated lands and especially favored rainfall areas such as those represented by the alpine meadows.

In the eastern half of the United States, where rainfall is not the limiting factor, there is a more or less indefinite line separating the distinctly northern grasses like Kentucky bluegrass, timothy, and redtop, from the southern grasses, such as Bermuda, carpet, and Dallis. The 60° isotherm very nearly marks this division line. (Fig. 91) In the Great Plains and intermountain region rainfall is the controlling factor and temperatures play a secondary part.

Soil conditions control the character of pastures only where the rainfall is sufficient so that the soil qualities become operative. The nature of the soil has much to do with the type of vegetation in the eastern or humid part of the United States, where tame or introduced grasses

provide so much of the pasturage

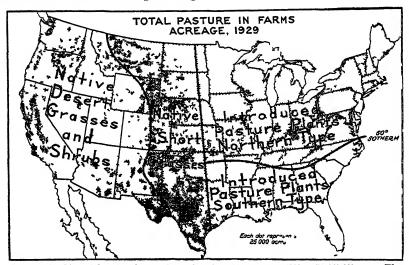


FIGURE 91—The total pasture land in farms, based on the census for 1929, is 477,908 696 acres

The distribution in the East represents more nearly the entire pasture acreage than in the West, where a large proportion of the grazing land is not in farms. The most important class of pasture plants is indicated for each section

#### Extent and Productiveness of Pasture Lands

The distribution of the total pasture acreage as indicated by the census is also shown in Figure 91. Unfortunately the acreages given in the census reports include only the grazing land in farms, which represents but 36 per cent of the total grazing land. It is estimated, however, that these pastures in farms, including temporary pastures, supply the pasturage for 66 per cent of the total livestock. In the West the percentage of grazing lands not in farms is much greater than it is in the East because of the much greater areas of public lands in the West. However, in the Southeastern States such grazing land may become a factor in the support of livestock. The total pasturage on the vast acreage of cut-over lands in the piney-wood section of the Gulf States, much of which is not in farms, can not be ignored in any consideration of livestock production. From March until July, inclusive, such land has a carrying capacity of one animal unit for each 10 acres. The effective utilization of these lands will probably come through a combination of grazing and reforestation. The land outside of farms in the Northeastern and North Central States is not likely to be utilized to the extent to which similar land in the Gulf States will be utilized, because of the hardwood or broad-leaved character of much of this timber and the long winters, which not only make it necessary to provide much expensive harvested feed, but also require buildings to

protect livestock from cold.

West of the ninety-eighth meridian, where the native grasses have been destroyed by cultivation or overgrazing, crested wheatgrass, bromegrass, and slender wheatgrass may be employed to good advantage in restoring such land to pasture uses. Nowhere in this region, however, is it advisable to attempt the improvement of grazing lands by replacing the native grasses with introduced species. Improvement is best accomplished by encouraging the better native forage plants through properly controlled grazing.

In the short-grass region, which is ordinarily designated the Great Plains, the grazing lands have an estimated average carrying capacity of one animal unit to 5 to 15 acres in the eastern one-third, and one

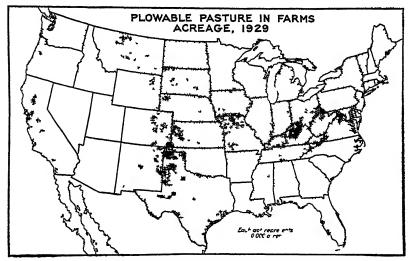


Fig. RE 92—Distribution in 1929 of plowable pasture land in farms, based on the census, is 136,515,489 acres. This part of the pasture acreage is not only the most productive in its natural state, but is capable of the most improvement

animal unit to 15 to 25 acres in the western two-thirds. (Fig. 90.) In the Great Plains there are, according to the Census Bureau, 187,-022,070 acres of pasture in farms, of which 38,111,591 acres are plowable. West of the Great Plains, in the Great Basin and intermountain region, are mostly semidesert lands, 25 per cent of which are rated as having a carrying capacity of one animal unit to 25 to 50 acres. The remainder of this region is occupied largely by desert shrubs such as sagebrush in the north and creosote bush in the south. On such lands 75 acres or more are required to support one animal during the grazing season. In this western section the Census Bureau recorded a total of only 115,962,712 acres of pasture land in farms, 8,564,927 acres of which were plowable, and 107,397,785 unplowable. A large percentage of the grazing land is outside of farms and therefore not included in the census enumeration.

In the eastern humid area north of the 60° isotherm there are 134,-021,394 acres of pasture land in farms; of this 77,946,250 acres are what the census terms plowable pasture. (Fig. 92.) This plowable pasture

is capable of improvement by fertilizer applications, and seeding with such grasses as Kentucky bluegrass, timothy, redtop, bromegrass, orchard grass, and clovers and lespedeza. Unimproved, such pastures have an average carrying capacity of one animal unit to 2½ acres, but they may be improved to a point where 1½ acres or less will suffice to support an animal unit.

The remainder of the pasture land in this section, 56,075,114 acres, is woodland pasture and land too rough or stony or wet to be available for cultivated crops. Such land is not sufficiently productive to justify any considerable expense in improving it. From 5 to 10 acres are

required for each animal unit, according to conditions.

South of the 60° isotherm there are, according to the census, 40,-902,520 acres of pasture land in farms; of this 11,892,721 acres are plowable pasture capable of being improved by the application of fertilizers and by being seeded with Bermuda, carpet, and Dallis grasses combined with lespedeza, hop clover, white clover, and black medic. The remaining 29,009,781 acres of the pasture land in farms is largely cut-over or burned-over forest land or land that is untillable for other reasons. Such land is occupied largely by native grasses, mostly Andropogon and Panicum species, and approximately 10 acres are required for each animal unit.

H. N. VINALL and C. R. ENLOW, Bureau of Plant Industry.

PASTURES Should Supply a Larger Proportion of Feed Used by Livestock

Fully 50 per cent of the feed for livestock in the United States comes directly from pasture and range. This is equivalent to saying that halt

of all the meat, milk, wool, hides, and horse and mule power is produced directly by grazing. That grass is the cheapest feed has been so generally accepted that not much effort has been made to prove it experimentally. Few direct comparisons have been made to show definitely the relative returns from land—(1) in cultivated crops raised to be harvested and (2) in permanent or temporary pastures intended for grazing. In general the policy has been to cultivate as much land as possible, leaving for pasture chiefly land unfit for cultivation because it is too rough, too dry, too wet, too poor, or otherwise unsuitable. If tillable land is used for pasture, the area is often limited to that barely sufficient to carry stock through the grazing season. Such a practice, of course, necessitates heavy feeding of harvested crops during periods of pasture shortage. Another consequence of limited pastures is that, when overgrazed (fig. 93), they do not begin to supply the maximum quantity of feed. In fact, the desirable forage plants are often greatly reduced or completely killed out by extremely heavy grazing. This is particularly true in areas of limited rainfall.

Experiments to determine the influence of various land rotations on the quantities of beef, pork, and mutton produced from a given area are in progress at the Illinois Agricultural Experiment Station. Four fields are being used, one of which is in bluegrass and the other three in 4-year and 5-year rotations of corn, small grain, soybeans, sweetclover, and the Haas pasture mixture. The Haas mixture, originated by Ralph Haas, an Illinois farmer, consists of 2 bushels of oats and 2 pounds each of sweetclover, red clover, rape, alsike clover, and timothy. It is sown in the spring and furnishes excellent grazing for two

seasons. The first season the pasture consists largely of oats, sweet-clover, and rape; the second season timothy, alsike, and red clover furnish the bulk of the pasture, with sweetclover helping out. Though conclusions are not yet available, the experiments deserve close attention by stockmen.

Analyses of samples of young grass have shown that the quality of the feed can be changed greatly by fertilizers, particularly on impoverished soil, and much interest is being shown in this phase of pasture improvement. Many experiments relating to the use of fertilizers on

old pastures and new seedings are under way in this country.

Experiments have also been designed by which to study pasture management, and tests involving rotation, grazing, deferred grazing, and continuous grazing are in progress. Supplemental grazing crops, such as Sudan grass, sweetclover, rape, soybeans, and others, are under grazing test to determine their relative value for supplying green feed

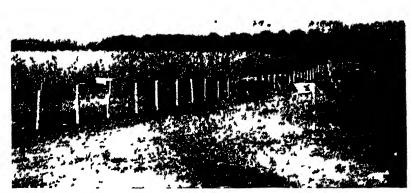


FIGURE 93 —Pastures that are too heavily grazed not only ful to yield maximum returns but also require the use of more expensive supplementary feed during periods of drought

during dry summer weather, when permanent pastures frequently drop in production. From the intense interest manifested in the experimental work under way, it is evident that farmers and others realize the importance of pastures in the economical production of livestock and livestock products.

# The Hohenheim System of Grazing

Much interest has been shown the last few years in a system of grazing dairy cows on limited areas of pasture in Germany and England. The system, which was devised in Germany, is called the Hohenheim system and combines rotation grazing with intensive pasture fertilization. The grazing land is divided into from 6 to 10 pastures, each grazed in turn by high-producing dairy cows followed by low producers and dry animals. A complete rotation is made in from three weeks to one month. When the animals are removed from a pasture, nitrogenous fertilizers are applied to insure rapid growth of high-protein forage.

The indications are that such practices are justified for milk production, where it is desirable to use high-priced land for grazing and where

there is adequate and well-distributed rainfall.

The apparent success of this system in Europe has resulted in several trials in this country. The system, with various modifications, is under test at the State experiment stations of Massachusetts, Ohio, Michigan, and Wisconsin, and several dairy farmers are using modified forms of it in New England. A replication of the Hohenheim system as originally devised is under test at the United States Department of Agriculture experiment farm at Beltsville, Md., in comparison with continuously grazed pasture. This work is carried on cooperatively by the Bureau of Dairy Industry and the Bureau of Plant Industry.

#### Advantages of Fattening Livestock on Pastures

The Kansas and Ohio experiment stations have recently shown the rather remarkable advantages of fattening cattle on pasture as compared with fattening similar cattle in barns or dry lots. On the same rations of concentrates, pasture-fed cattle at the Ohio station gained 11 per cent more than barn-fed cattle and 16 per cent more than cattle fed in an open shed. As a consequence, the cost of gains for the pasture-fed cattle was correspondingly lower. The cost of silage and hay fed in dry lot was slightly more than the estimated value of the pasture. The pasture-fed cattle dressed practically as high as the cattle fed in dry lots.

At the Purdue (Ind.) and Mississippi stations, the high value of pasture has been brought out strikingly in lamb production. The grade of lambs and the palatability of the meat of lambs slaughtered when from 4 to 5 months old were influenced relatively little by grain fed as a supplement on good grass while the lambs were suckling the ewes.

Pastures also have an important place in profitable swine production. According to experiments conducted by the Bureaus of Animal Industry and Plant Industry at Ardmore, S. Dak., hogs fattened on pasture supplemented with concentrates, self-fed, may be expected to make approximately 10 per cent more gain than they will on the same feeds in dry lot. When fed in dry lots, hogs require about 10 per cent more concentrates per 100 pounds gain than do pasture-fattened hogs. The experiments also showed that when hogs were on pasture only 8 per cent of the feed consumed was tankage, whereas in dry lot 12 per cent of the rations selected by the hogs was tankage. In addition, the use of clean pastures in what is known as the swine-sanitation system materially reduces pig mortality and stunted growth and enables hogs to reach market weight practically free from parasites.

In the management of farm work stock, feed and labor requirements may be considerably reduced by turning the work animals on pasture at night during the grazing season. They may be kept advantageously on pasture with a reduced grain ration during short idle periods,

and with no grain at all during long periods of idleness.

# Ample Pastures Bring Benefits

In addition to such direct advantages in livestock production there are other important advantages in making maximum use of pasturage. Depletion of soil fertility is less rapid, since the animals' droppings are returned to the soil without loss and at no expense. On rolling

l and, such as that in northern Missouri and southern Iowa, as much erosion takes place in one year on cornland as in about 47 years on

bluegrass pasture.

The area of land used for hay and grain crops in the United States is almost five times that of land in improved pasture. Ten per cent of the cultivated-crop acreage sown to pasture would add approximately 50 per cent to the present area of improved pasture land. Such a change would reduce grain crops materially, reduce the labor spent for crop production, reduce erosion, provide more adequate pasturage for periods of drought, relieve pastures now overgrazed throughout the season, and preserve wood lots—all without increasing farm expenses or the supply of animal products. These results appear to be in general accordance with present sound agricultural practices.

A. T. Semple, Bureau of Animal Industry, C. R. Enlow, Bureau of Plant Industry.

PEA-WEEVIL Damage
Can be Decreased by
Certain Farm Practices

In sections where the pea weevil has been introduced, certain farm practices are largely responsible for the presence or absence of heavy infestations of the

insect. Instead of focusing attention on the fumigation of the peas just before planting them, consideration should be given to the important points of (1) the time and method of harvesting the crop, (2) the treatment of the seed after harvest, and (3) the disposition of the peas left in the field as waste after harvest. Proper attention to these points will materially reduce the infestation in the next year's crop or will prevent the building up of heavy infestations.

### Factors Governing Time and Method of Harvesting

The peas should be harvested as early as possible. Aside from consideration of the pea weevil, early harvest of most varieties is desirable to prevent loss from shattering, because the longer the peas stand after being ripe the more the pods are likely to split open and shed the peas. When pea weevils are present, it is more desirable to harvest early so that the crop can be fumigated to kill the contained weevils before they emerge and thus prevent further damage. Early harvest also prevents the escape of many pea weevils in the field. The weevils which escape seek shelter, hibernate, and come out in time to infest the next year's crop. Early harvest is possible only where the peas are planted alone or with another early maturing crop. The acreage should not be too large to be harvested quickly with the machinery and help available.

The method of harvesting must be determined largely by the size of the crop and by climatic conditions. Obviously, the methods would not be the same in a small garden and in a 500-acre field. Neither would they be the same in a windy section and in a wind-free section. Whether the crop is large or small, whether it is harvested by hand or by the most modern machinery, care should be exercised to reduce the loss from shattering as much as possible. If the peas are mowed and raked, these operations should be performed before the vines are overripe and while they are yet damp. Care should be taken not to trample the pea vines more than is necessary. A good track clearer should be

used, so that the wheels of the mowers and rakes will shell out the

minimum quantity of peas.

Where heavy windstorms are frequent at harvest time, heavy losses may occur if the peas have been cut and left in windrows or in piles, as the wind rolls the peas about in the field or even carries them away. (Fig. 94) In such places it may be more economical to use headers for harvesting the peas. In sections where there is little danger from windstorms, combine harvesters equipped with pick-up attachments are very satisfactory. In either case care should be taken to leave as little of the crop on the field as possible. The fields should be properly opened so that the peas are not trampled down or left around the



FIGURE 94 -Pe is that have been rolled about by the wind

outer edges of the field. Threshing should not begin in the morning until the vines are dry enough thresh well or many of the peas will go through with the straw. In some instances as many peas as were harvested, or even more, are left on the ground. Field counts have shown that from 500,000 to 3,000,000 peas per acre are wasted in this man-

ner The number of pea weevils thus left in the field to infest the next year's crop depends upon the percentage of infestation as well as upon the number of peas left.

# Fumigation of the Entire Crop Necessary

The entire crop should be fumigated. Under the present practices in some sections, as many of the weevily peas as possible are separated out at the cleaner. The peas that are supposed to be free of weevils are then fumigated and placed on the market, while the screenings, containing most of the weevil-infested peas, are not fumigated. Frequently the screenings are returned to the farm to be used as feed for livestock. The screenings are often sacked in a poor grade of sacks, some of which have holes that permit the weevils to escape and seek suitable shelter for the winter. Even when the screenings and weevily peas are ground up for feed, many of the weevils escape. The whole crop should be fumigated immediately after harvest and before it is cleaned.

# Peas Remaining in Field Must Be Destroyed

As has already been pointed out, the loss of peas at harvest time is usually very great. The disposition of these unharvested peas is a very important problem in the control of pea-weevil infestations. The pea weevils in the harvested peas can be exterminated by fumigation, but those left on the field in the unharvested peas emerge and seek winter shelter. They are capable of withstanding low tempera-

tures and they select locations for hibernation where they are well protected from storms and from predacious enemies. They seem to prefer to hibernate under the rough bark of such trees as pines, firs, oaks, etc., and in the moss, liverworts, and lichens attached to the trunks and branches of the trees. They also hibernate in the cracks in fence posts and telegraph poles, and in cracks and under shingles of barns and other outbuildings. As many as 500 pea weevils have been found crowded into the cracks of one fence post adjoining a badly infested field. After living through the winter in these places, they come out in the spring to feed on pollen from different kinds of flowers until the pea pods begin to form. They are then ready to lay their eggs on the young pods.

In small gardens it would be an easy matter to care for the peas which are usually left. Peas which become too old and hard to be eaten green are often left on the vines without being harvested. If they are not being kept for seed, they should be destroyed before they ripen. The vines should be gathered and fed to livestock or destroyed, so that the contained weevils will have no chance to complete their development and emerge. Peas that are being grown for seed should be gathered as soon as they are ripe and fumigated immediately.

In large fields the problem is different, as the unharvested peas are on vines that were missed or else they are scattered on the ground so that they can not be gathered economically. Any practice is beneficial if it reduces the number of peas before the pea weevils have time to emerge. The warm ground and hot sunshine hasten the development of the pea weevils, so that they begin to emerge within a few days after harvest and in some sections they are practically all gone from the peas within two or three weeks. Therefore, anything that is intended to reduce the weevil population must be done immediately after harvest.

Sheeping off or hogging off the field immediately after harvest will prevent the emergence of some weevils, but will allow enough weevils to escape to infest the next year's crop. Immediate plowing kills some

of the weevils, but allows many to escape.

From the standpoint of controlling the pea weevils the most satisfactory and thorough method of disposing of the unharvested peas is immediately burning the stubble on the field. This can be done very readily if the crop has been harvested with a header or a combine having a revolving fan for spreading the straw over the ground. Burning would not permit of the greatest utilization of the pea straw for feed and fertilizer, but in sections where weevil damage is the limiting factor it is better to lose the straw than to have to discontinue the

growing of the pea crop.

Burning the hedgerows around the field in the fall will kill many weevils that have found shelter there, and will be a protection to the next year's crop. Before burning is attempted due precautions must be taken to prevent the fire from getting out of control and spreading to other crops and buildings. Usually, besides obtaining a fire permit, it is necessary to plow a few furrows around the outer edges of the field which is to be burned. Around fields that are removed from timber in which weevils can hibernate, metal fence posts are preferable to the ordinary wooden posts, in which hundreds of weevils can spend the winter. Metal fence posts also permit a more thorough burning of the hedgerows.

Farm practices which tend to reduce pea-weevil damage, then, are (1) early and careful harvesting of the crop, (2) thorough fumigation of the whole crop, and (3) immediate destruction of peas remaining on the field after harvest.

A O LARSON, Bureau of Entomology.

PERISHABLE Commodities
Act Promotes Prompt
Settlement of Disputes

The object of the perishable agricultural commodities act is to suppress unfair and fraudulent practices in the marketing of perish-

able agricultural commodities in interstate and foreign commerce. The act seeks to accomplish this by providing that commission merchants, dealers, and brokers must secure licenses from the Department of Agriculture and that violations of the act may be punished by publication of the facts or by suspension of the offender's license for a period not exceeding 90 days or by both publication and suspension. For repeated or flagrant violations an offender's license may be revoked. If a complainant can demonstrate that he has suffered damages because of the action of an offender the Secretary of Agriculture can issue a reparation order in the amount of damages.

Complaints may be filed under this act in person, by telegraph, by telephone, or by mail. For the most part complaints are filed by telegraph or by mail, about 40 per cent being filed by telegraph and 60 per

cent by mail.

Practically all of the complaints filed by telegraph relate to cars which at the time are standing on track and on which quick action is desired. Most of such complaints pertain to rejections of cars by receivers, but there are many instances of receivers complaining against shippers on the ground that the goods in the cars on track fail to comply with the specifications set forth in the contract. The department gives prompt attention to telegraphic complaints and in most cases succeeds in effecting a settlement. If an amicable settlement can not be reached the complainant is advised that a formal complaint from him will be

entertained if he has the evidence to support it.

Complaints received by mail relate to transactions in which the goods in question have been disposed of, immediate action therefore not being necessary. These cases may cover cars which were rejected and sold by the shipper for the receiver's account, cars refused by the receiver on account of alleged failure to deliver in accordance with the contract, cars accepted by the receiver but which he claims did not comply with the contract, shipments for which payment has not been received or regarding which it is felt an incorrect accounting was rendered, or cases of making false or misleading statements regarding the quality, quantity, or disposition of, or the condition of the market for, any perishable agricultural commodity received in interstate or foreign commerce.

# Procedure in Telegraphed Complaints

When a complaint which seems to warrant investigation is received by telegraph the department immediately wires to the party complained of setting forth the facts as they have been presented and advising him that if these statements are correct he has violated the act. He is

asked to wire his side of the case so the department can take proper action. In many instances it is necessary also to wire the broker in the transaction for his confirmation and to wire the delivering railroad as to time of delivery. When sufficient facts have been presented the department expresses its opinion in the matter and endeavors to effect a settlement.

Complaints which are presented by mail are handled in very much the same manner except that communications are by post instead of by wire. When a complaint is received it is reviewed and, if found to come properly under the act, and if the facts presented justify action, a letter is addressed to the party complained against, setting forth in detail the allegations made and calling on him to satisfy the complaint or to furnish good and sufficient reasons for failure to do so. If the reply to this letter is unsatisfactory, and efforts to effect a settlement seem to be useless, the complainant is requested to file a formal complaint along the lines indicated in the sample furnished him, and upon receipt of this complaint the papers in the case are forwarded to the solicitor of the department for consideration, with a view to holding a hearing.

Such a hearing must be held in a city in which the party complained of is engaged in business. The Secretary's decisions are based upon the record of the evidence presented at the hearing, taking into consideration any briefs which may have been filed or any arguments which may have been made on behalf of the parties involved. These decisions review the facts in the case, discuss and decide any legal points involved, and state whether the case is to be dismissed or whether a reparation order is to be issued and, if so, the amount thereof, and fix the

punishment which the Secretary feels should be inflicted.

H. A. SPILMAN, Bureau of Agricultural Economics.

PIGS Produce Pork
More Efficiently on
Limited Feed Levels

Do pigs which are allowed all the feed they can consume produce pork more economically than those fed on a restricted basis? It is true that full feeding or self-feeding

generally produces the most rapid gains and shortens the time required for a pig to reach market weight. Results of recent feeding tests conducted at the United States Animal Husbandry Experiment Farm, Beltsville, Md., have shown, however, that decreasing the feed intake to as low as 50 per cent of a full feed resulted in an increasing efficiency in the conversion of feed into pork.

# Tests Show Material Savings in Feed

In a test conducted during the fall of 1930, three lots of pigs were fed 2, 3, and 4 pounds of feed, respectively, per 100 pounds live weight, daily. The ration consisted of corn, tankage, alfalfa meal, and mineral mixture in proportions to give a nutritive ratio of approximately 1:5.5. The pigs were kept in dry lots without access to pasture and were hand-fed individually twice daily in a compartment feeder. They weighed approximately 68 pounds each at the beginning of the test and were slaughtered when they reached weights of approximately 200 pounds.

The pigs on the 4-pound allowance required only 119 days to reach slaughter weight, but they consumed an average of 559 pounds of feed to do so. On the other hand, even though the pigs on the 2-pound allowance of feed required 166 days to reach the same weight, they consumed, on the average, only 395 pounds of feed. Thus, the restriction of the feed from 4 to 2 pounds per 100 pounds live weight resulted in a saving of over 150 pounds of feed on each pig even though additional time was required to reach market weight. The pigs on the 3-pound allowance were intermediate to the other two lots. They reached an average weight of 200 pounds in 128 days and consumed 458 pounds of feed. One hundred pounds of feed thus produced 32, 29, and 24 pounds of pork when fed at the 2, 3, and 4 pound levels, respectively. In other words, the most restricted lot produced a third more pork on an equal amount of feed but in a 40 per cent longer feeding period than the full-fed lot. No injurious or distressing effects upon the physical development of the pigs were observed even in the lowest feeding level.

#### Restricted Feeding Produces Lean Pork

There was also a marked difference in the leanness of the pork produced by the high and low feeding levels. The leanest pork was produced on the lowest feeding level. This was accompanied with an increased yield of the higher-priced lean cuts such as the ham and loin. In view of the growing market demand for lean rather than fat pork and the higher prices paid for the lean cuts, the pork from pigs fed on a restricted basis may yield an increased return in the meat market.

The results of these tests indicate that restricted feeding of the grain ration may be applied, with profit, to average feed-lot conditions. One of the main requirements, of course, is the use of a well-balanced, nutritious ration which supplies the materials necessary for growth

rather than for fattening.

Bocause of the longer feeding period and possible extra work required in limited feeding, the cost of labor may offset the advantages mentioned. But especially when the feeder wishes to carry his pigs through the seasonal periods of low prices to those of increased prices the saving of feeds is likely to be great enough to warrant the extra time and labor.

N. R. Ellis and J. H. Zeller, Bureau of Animal Industry.

PINE Seedlings Show Response to Sunlight in Growth and Density was sought in a virgin Norway pine stand on the Chippewa National Forest, Minn., which is probably typical of the primeval forest of the Lake States. (Fig. 95) The old trees average 200 years in age and attain heights of 80 to 100 feet.

The old trees bear abundant seed at fairly regular intervals. In some places a plentiful crop of young pine seedlings has come in, while in other places the undergrowth contains no pines. If the presence or absence of pine seedlings and their growth when present were considered in relation to the amount of sunlight they receive, the nature of this relationship would answer the question about sunlight.

The question was asked the young pines themselves by measuring

the light available and noting their abundance and rate of growth.

The young pines answered that both their abundance and growth are determined to a considerable degree by the amount of light they receive, and both increase with increasing light. Figure 96 shows graphically the annual height growth and abundance of young pine for different amounts of light. In light values below 5 per cent of full sunlight, pine seedlings were either absent or in such poor condition that survival was impossible. With 35 per cent light there were over 9,000 seedlings per acre, or ample numbers to restock the area completely after cutting. With increasing amounts of light the density of the seedlings continued to increase. At 93 per cent light there were over 18,000 seedlings per acre. Densities much greater than 9,000 per acre often result in overcrowding and stagnation



FIGURE 95 —Virgin Norway pine stand with Norway pine reproduction in a small opening young trees are 18 years old and 4 to 5 feet high

Where young seedlings are not present in virgin Norway pine forests having 35 per cent light, or more, the timberland owner may be sure that no method of cutting the old stand is likely to bring them in.

# Densest Stand Had 17 Per Cent Light

At no place in the forest was the shade of the old trees so dense as to exclude young pines. The densest pine stand had 17 per cent light and 3,500 seedlings per acre. Hazelnut, alder, and other brush species reduced the light to less than 5 per cent, in which no pine seedlings survived long.

The response of young seedlings to increased light showed that height growth in young pines receiving 30 per cent light or less is so slow that they can not outgrow the competing shrubs and young hardwoods. Trees in full sunlight were making the fastest growth. Here, however, competing vegetation is most aggressive; hence, unless the pine seedlings have already become established and made sufficient growth to hold their own against other plants, it is easier for them to start in slight shade (50 per cent light, or more) where competitors are less vigorous. The importance of competing vegetation can scarcely be overemphasized.

Nature, when undisturbed by fire or man, provides the surest method of perpetuating the pine forests. The forester would call it selective logging by groups. It consists of enlarging gradually small openings where young pines are already established. Where no seedlings are present small openings made by cutting should be sown or planted. Surrounding trees protect the young seedlings from excessive heating and drying until they attain sufficient size to thrive in full sunlight. Enlarging the opening allows a second group of seedlings to start. If the openings are properly spaced the entire area should be reforested by the time the third cutting is completed.

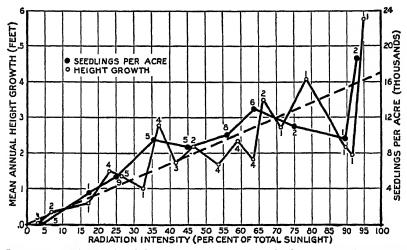


Figure 96 —Height growth and abundance of Norway, white, and jack pine reproduction growing in various light values in a virgin Norway pine forest

The answer to the original question, then, is that for good establishment young pines need about 35 per cent light, or about the amount present after a well-stocked, mature stand has had a light cutting. For best growth, young pines past the seedling stage need full sunlight.

HARDY L. SHIRLEY, Forest Service.

PLANT-DISEASE Hazards, Though Very Fluctuating, Demand Constant Action Among the hazards that must be faced in the production of many of our major crops, one of the most poorly measured and at the present

time least predictable is the loss from disease. It is well known, however, that the losses from certain diseases vary much more widely from year to year than do others. Among those that fluctuate in severity are late blight of potatoes, brown rot of peaches, and scab of apples. The estimated losses from these diseases during the decade 1920-1929 are indicated in the accompanying graphs. These curves are based on estimates sent in annually to the plant disease survey of the Bureau of Plant Industry by collaborators situated throughout the United States. These losses are always expressed in percentages of crop or in terms of bushels per acre, never in dollars, because of the complex economic factors involved. In many cases, perhaps in most, the figures furnished by collaborators are estimates in the true sense of the word; that is, they are not the result of counts or calculations, but are based on general field observations. They are made, however, by careful and experienced field observers and are the most trustworthy figures available.

In making up the percentage of loss for the United States the figures for the individual States are first reduced to bushels or other units and

summed to obtain the total loss for the whole country. The percentage is then computed on the assumption that 100 per cent is the total actual production plus the estimated losses from all diseases of the

crop.

As shown in Figure 97, the loss from brown rot of peaches, considered on a national basis, was almost 12 per cent in 1920,fell toless then 3 per cent in 1923, and less than 2 per cent in 1925, rose again to over 10 per cent in 1928, and dropped to less than 5 per cent in 1929. Apple scab (fig. 98) showed a loss of over 12 per cent in 1922, over 9 per cent in 1924 and 1928, and less than



4 per cent in 1923, Figure 97—Estimated losses from brown rot of peach in the United 1925, and 1926.

States, 1920-1929

### Fluctuation in Loss From Late Blight

To an observer in the United States for the first time in 1923, late blight of potato might have appeared to be a minor disease, for the estimated loss that year was less than 0.2 per cent. (Fig. 99.) In 1921 and 1929 the loss from this disease was estimated at less than 1 per cent. In 1920, on the other hand, the estimated loss from this disease alone was 8 per cent of the total crop, and in 1926 and 1928 it reached approximately 7 and 6 per cent, respectively.

All the causes of loss thus far discussed are well-recognized diseases, caused in each case by a single organism. Sometimes, however, as in

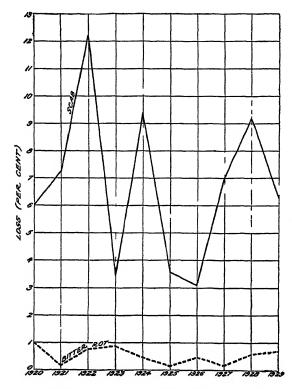


FIGURE 98 —Estimated losses from scab and bitter rot of apple in the United States, 1920-1929

storage rots, it is not easy to separate the amount of loss due to each fungus without special study, and for purposes of estimate they are therefore grouped together. Such a group, however, may show decided variation as a This is the whole. case with storage rots of sweetpotato, which have been made the subject of much careful study. (Fig. 100.) From a maximum of 23 per cent in 1920, the estimated loss from these diseases fell steadily to less than 10 per cent in 1923, 1924, and 1925, since which time it has risen somewhat, reaching almost per cent in 1928.

Of course not all the diseases of apples, potatoes, or peaches

fluctuate in the same way as do those mentioned. Some, such as bitter rot of apples and blackleg of potatoes, when considered on a national basis, remain a continual and comparatively steady drain on the production of the crop. (Figs.

98 and 99.)

Although these losses are expressed in terms of percentage loss for the entire United States, the loss from any disease is of course far from falling equally on all producing sections. In the United States the region of greatest severity of potato late blight includes New England States, New York, and Pennsylvania. Apple scab is more severe in the northern than in the

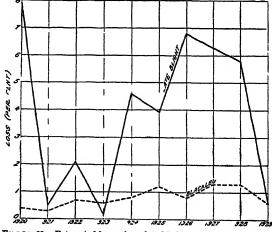


FIGURE 99 —Estimated losses from 1ste blight and blackleg of potato in the United States, 1920-1929

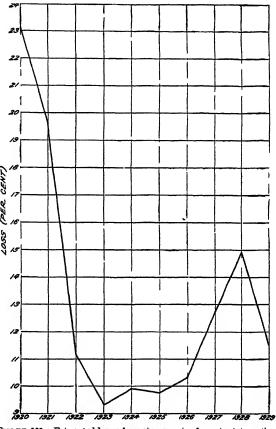
southern part of the United States, while brown rot is especially severe in the peach-growing districts of the Atlantic coast from New Jersey southward.

### Some Controlling Factors Known

Some of the factors that influence the prevalence of plant diseases are well known. Unusual abundance of potato late blight, peach

brown rot, and apple scab is closely associated with timely or abundant rainfall. On the other hand, the fluctuation in the amount of loss from storage rots of sweetpotatoes seems more probably to be due to increase and decrease in the care with which control measures are carried out.

It is obvious that there are occasional seasons when the incidence of certain common diseases is so slight there is little advantage in control practices. A succession of such seasons often tends to carelessness and a general relaxing in control measures, with the result that losses from disease are even greater when the next bad year arrives. If disease-free years could be accurately predicted it might be possiomitting sprays in



ble to save money by Figure 100 -Estimated losses from storage rots of sweetpotato in the

those years. Such predictions, however, must be far in the future, even if they are ever possible, and at present the only safe rule is "to keep everlastingly at it."

NEIL E. STEVENS, Bureau of Plant Industry.

PLANT Explorers Bring Valuable New Species and Varieties to U. S.

Keeping step with America's changing and expanding agriculture, recent exploration activities of the Department of Agriculture have brought back

many diverse plant contributions from widely separated parts of the globe. Agricultural exploration has two objectives: (1) The intro-

duction of new and noncompetitive crops, both orchard and field, as an aid to the diversification of American agriculture; and (2) the introduction of varieties of crops and trees already grown in the United States which may be more resistant to disease and insect pests or to climatic extremes, thereby increasing unit yields per acre and reducing costs of production.

### Extensive Exploration for Soybean Varieties

The soybean is a crop whose commercial development in the United States has been a phenomenon of the last 15 to 20 years. The success of this introduced legume throughout a wide area in the Middle West has led to a demand for varieties suited to other parts of the country

In the spring of 1931 P. H. Dorsett, of the Division of Foreign Plant Introduction, and W. J. Morse, of the Division of Forage Crops and Diseases, returned from the Orient after a search of more than two



FIGURE 101 — Methods of transporting the oriental persimmon were investigated by the Dorsett-Morse expedition

years for new varieties of soybeans. Their travels took them to Japan, including Hokkaido, the northernmost island, and the peninsula of Saghalin, to Manchuria, Chosen (Korea), and China. Almost 3,000 soybean varieties were obtained in these great soy-producing areas

Special attention was also paid to other legumes of possible value to American agriculture, and important collections of mung beans, lespedeza, alfalfas,

and Melilotus varieties were made. Other valuable field-crop introductions resulting from this expedition include collections of barleys, wheats, and grasses.

A number of valuable horticultural contributions were also obtained A special study was made of the oriental persimmon and about 200 introductions were made from Japan, China, and Chosen. (Fig. 101.) In Peiping the expedition discovered the fruit being processed on a large scale to remove astringency, and made a thorough study of the methods used. Investigations of the outdoor storage of this fruit, begun during a previous expedition, were continued.

Numerous berries and Prunus species were included in the fruit collections made. New varieties of the oriental flowering cherry, rhododendrons, azaleas, lilies, and many other ornamental and flowering plants were procured. Different types of melons and vegetables completed the horticultural introductions; these are primarily for the

use of plant breeders.

# Blight-Resistant Chestnut Sought in Far East

In the fall of 1930 another important expedition in the Far East was terminated. R. Kent Beattie, of the Division of Forest Pathology, returned to the United States after a period of almost three years spent

in searching for chestnuts and chestnut relatives that might be resistant to chestnut blight and be used to replace the native chestnut wiped out by this disease in the eastern United States. His search led him throughout Japan, including the comparatively little-known island of Taiwan (Formosa), the mountain ranges of Chosen, and the hill country of China, while on the return trip stops were made in southeastern Asia. His explorations resulted in procuring scions of 90 cultivated varieties of chestnut and a total of 250 bushels of seed of many other types. At the present time seedlings are being grown by foresters and experiment station workers from Louisiana to Michigan west of the Alleghenies, and from Alabama to Connecticut on the Atlantic seaboard.

The areas covered in the search for chestnut varieties were also rich in rhododendron and azalea species and varieties, and seed of many of these was also obtained. Some of the seedlings are already being used for hybridizing by department workers for the development of improved types for American gardens.

#### Blight-Resistant Alfalfas and New Fruits from Asia

The spread of bacterial blight of alfalfa has taken heavy annual toll throughout the United States, particularly in the Middle West. It

has made the development of blight-resistant strains imperative if this crop is to continue to be profitable in many sections. A study of old alfalfa plantings indicated that some types, grown from seed originally coming from Turkestan, were apparently immune. Accordingly, in 1929 H. L. Westover, of the Division of Forage Crops and Diseases, went to Russian Turkestan and neighboring parts of eastern Eu-



FIGURE 102—The Westover-Whitehouse expedition seeking alfalfas and fruits in the mountainous region of southern Turkest in

rope to hunt for resistant alfalfa types. (Fig. 102.) Because of the opportunities for procuring new varieties of fruits, nuts, and melons from this relatively isolated part of the world, W. E. Whitehouse, of the Division of Foreign Plant Introduction, accompanied Mr. Westover and later continued on into Persia. The scattered and hardly accessible alfalfa-growing districts of the Turkestan deserts and mountain regions yielded many types of alfalfa together with other legumes, cereals, and grasses. These are now under trial by department specialists.

A number of interesting introductions of importance from a horticultural point of view were made. Melon collections were obtained in both Turkestan and Persia and are being used in the selection and breeding of disease-resistant strains in the United States. Collections of wild apricots, pears, apples, and the pistache nut were made in the mountainous regions of Turkestan near the Chinese frontier. The principal pistache-growing areas in Persia were visited and seed and scions of the best types were collected. Several hundred seedlings of

the best Persian varieties of this nut are now being grown as a basis of selection for large-fruited types for the Southwest. This expedition returned in December, 1929.

#### Disease-Resistant Wheat and Barley Varieties

In the early years of the present century Russia yielded the hard or durum wheats that have become such an important factor in our great wheat-growing States. Varieties of other cereals—barley, oats, and rye-introduced about the same time, have also contributed extensively to our national farm returns. After many years, attention has again been turned to Russia in connection with cereal problems. The annual losses sustained in the United States through cereal diseases are tremendous. The material reduction of these losses would greatly decrease our cost of production and permit more successful competition in world markets. To study cereal diseases in the great grain-growing areas of Russia and, if possible, to locate varieties of wheat and barley more resistant to disease than those we now have, James G. Dickson, cereal pathologist of the University of Wisconsin and agent of the United States Department of Agriculture, was sent to Russia in 1930. His travels took him from Moscow to Transcaucasia, formerly Armenia, and from the eastern to the western frontier of European Russia. New strains were studied in the field and at the numerous large experiment stations where thousands of varieties are now under trial. Wild types were sought in the mountainous region of the Caucasus. From all these sources many promising strains and varieties were collected.

#### Alfalfa and Fruit Varieties

Resuming the search for blight-resistant alfalfa, begun in the summer of 1930, H. L. Westover undertook to explore Spain and north African countries for alfalfa and other forage crops, while K. A. Ryerson of the Division of Foreign Plant Introduction sought citrus and deciduous fruit varieties and other shrubs and trees valuable to American horticulture. Together they crossed north Africa from Morocco to Tunis and return, visiting desert oases and Berber settlements in the Atlas Mountains (fig. 103) and securing seed of indigenous types of both forage crops and fruits of promise. In Spain Mr. Westover spent three months visiting all the important alfalfa-growing areas and in addition hunted wild types in the Pyrenees and in the Sierra Nevada of Granada. As a result, over 300 alfalfa introductions were obtained, together with numerous other legumes and grasses.

Earlier in 1930, in cooperation with the University of California, F. T. Bioletti, grape specialist, was sent as an explorer to Morocco, Algeria, and Tunis to study and collect indigenous types of grapes, especially those that would mature earlier than the kinds now grown in this country and would be superior for table use. Such grapes would be of special value in the irrigated desert areas of the Southwest. He also investigated and collected indigenous varieties of the apricot. As a result of this expedition, important collections of grapes were obtained and are now under trial at State and Federal stations in California, and a large number of native apricot seedlings are being

grown for selection studies.

During the winter of 1929-30 H. S. Fawcett, pathologist of the California Citrus Experiment Station, was engaged in studies of citrus

and date diseases of the Mediterranean region in cooperation with the United States Department of Agriculture. As a part of these investigations, citrus varieties not now grown in the United States were selected in the different countries and sent back for rootstock studies and breeding investigations.

#### Survey in Islands of the Mediterranean

In addition to the extensive explorations carried on in the western Mediterranean during the summer of 1930, a short survey of the eastern Mediterranean area, particularly the islands of the Aegean, was made by David Fairchild of the Division of Foreign Plant Introduction. With the facilities of the steamer *Utowana*, which had already served several department expeditions through the courtesy of Allison V. Armour, collaborator of the Division of Foreign Plant Introduction,



Figure 103 —Berbei villages in the Atlia Mountains of northern Africa, where alfalfa varieties were sought

many of the islands off the regular steamer routes were visited and studied from the point of view of possible future intensive exploration for valuable plants. The route, which included the Dalmatian coast, extended as far east as Istanbul and yielded much valuable data on relatively little-frequented areas and a number of promising plant introductions.

#### Latin America a Fertile Field

In common with the alfalfa and cereal industries, the potato industry has been widely affected by the spread of serious diseases of fungus as well as virus origin. Breeding investigations have been under way at State and Federal stations for the development of resistant varieties. To further these activities, wild types of the potato from their habitats in Central America and South America have been found necessary. To meet this need Paul Russell and Max Souviron of the Division of Foreign Plant Introduction were sent to Mexico in the summer of 1930. In the fall Donald Reddick of Cornell University and C. O. Erlanson of the Division of Foreign Plant Introduction followed. The work continued until the beginning of 1931 and was centered in the States of

Mexico, Puebla, Morelos, Hidalgo, Queretaro, Oaxaca, and Vera Cruz. Seventy lots of tuber-bearing Solanums of several species were found and seed and tubers brought back for propagation and distribution to potato breeders in State and Federal stations. It is planned to continue similar studies in South America until all desirable wild species have been made available.

#### A Promising Fiber Plant for Porto Rico

Limited tests of the Mexican pochote tree (Ceiba acuminata) in Porto Rico have indicated that it might be a source of valuable fiber if trees yielding good crops of high-quality fiber could be introduced. On the completion of the potato activities in Mexico, early in 1931 Souviron and Erlanson explored the States of Sonora, Sinaloa, Jalisco, and Chiapas, and collected quantities of seed from the best trees. A quite different type was found in the extreme southern State of Chiapas. Excellent germination has been obtained in Porto Rico, and a sufficient quantity of seedlings has resulted from the planting to give a thorough test of the tree as a source of valuable fiber.

#### Primitive Relatives of Cotton and Corn Discovered

Certain of the primitive relatives of cotton and corn have long been desired by department investigators in connection with the improvement of these crops through breeding. These species are not easily accessible, their habitat being along the isolated coastal regions of Mexico and Central America remote from centers of civilization. Through the generous offer of Allison V. Armour, it was possible for G. N. Collins and J. H. Kempton of the Division of Genetics and Biophysics, and T. H. Kearney of the Division of Egyptian Cotton Breeding, to visit this coastal region in the early part of 1931 on the steamship *Utowana* and to collect all of the special species desired. In addition, Doctor Collins collected a quantity of avocado seed from a high region of Guatemala where frost regularly occurs. These will be used for selection studies in an effort to develop hardier varieties of this fruit than are now available.

## Ornamental and Flowering Plants

The field of ornamental trees and shrubs and flowering plants is probably the most rapidly developing branch of American horticulture at the present time. The American people are going in for home gardening in a manner unheard of a few years ago. As a result, the demand for new and interesting ornamentals has become very strong. In order to profit by recent developments in this field in Europe and to secure some of the results of explorations for this type of plant material by European explorers, B. Y. Morrison of the Division of Foreign Plant Introduction spent several months during the spring and summer of 1931 in European countries. The new developments of plant breeders were studied, as well as the new introductions from explorations and the private and public collections of rare plants. From the best of these, selections were made for introduction and use in the United States.

KNOWLES A. RYERSON, Bureau of Plant Industry.

PORK Loins, When Seared, Shrink More in Weight Though Cooking Faster "Sear the roast in a hot oven" is old-time, cook-book advice founded on the belief that searing decreased the cooking losses. The truth of this

statement has wanted proof and has, in fact, been contradicted in recent work on beef, done by the United States Department of Agriculture and the Missouri Agricultural Experiment Station, participants in the national project—cooperative meat investigations. In order to determine what effect searing would produce on pork, a short study was made in which eight pairs of pork loins were roasted, one member of each with searing and one without. The cut included eight vertebræ from near the center of the loin.

The thickness of the fat layer covering the loins varied considerably owing to lack of uniformity in their trimming. To compensate for effects associated with this difference in fat layer, the loins were so divided as to balance the seared and unseared groups in this respect. Also to counteract possible differences in the two sides of the animals.

each group included four right and four left loins.

In measured quantities, 1 teaspoon flour, one-half teaspoon salt, and one-eighth teaspoon pepper were rubbed into each roast. A roast-meat thermometer was inserted in the loin end of the roast, which was the thickest part. The uncooked roasts and their containers were then

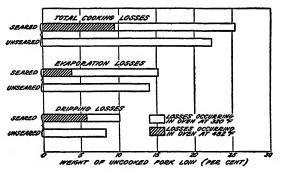


FIGURE 104 —Cooking losses of serred compared with unseared pork loins

weighed. One loin of each of these eight pairs was cooked in an open pan at a constant oven temperature of 320° F. (160° C.), until the meat thermometer registered 183° F. (84° C.) as the internal temperature of the roast. The corresponding loin of each pair was seared for 30 minutes at an oven temperature of 482° F. (250° C.), weighed, and then cooked in an open pan at an oven temperature of 320° F. until the meat thermometer registered 183° F. All the roasts were weighed at the end of the cooking period, as were also the drippings which had collected in the pans. The total loss of weight in the oven (the difference in weight between the raw and the finished sample) was divided into two parts: (1) Loss of volatile constituents (mostly water) by evaporation, and (2) loss of nonvolatile constituents, or drippings. The drippings consisted of fat and an unanalyzed brown essence, but the drippings are treated here as a whole.

### Method of Reckoning Cooking Losses

Total cooking losses, evaporation losses, and dripping losses for the searing periods, as well as for the entire cooking periods, were calculated as percentages of the raw weights of the roasts. Each of these factors was then averaged for both the seared and the unseared groups.

The average cooking losses for corresponding seared and unseared roasts are shown in Figure 104. The portion of the losses occurring in the searing oven is indicated by crosshatching (shading) on the bars representing the total cooking losses, the evaporation, and the drippings. The seared roasts lost relatively more in evaporation and drippings and consequently in total cooking than the unseared roasts.

As would be expected, the roasts that were seared cooked more quickly than those cooked throughout at the constant temperature used. The former took 29 minutes to the pound on the average as compared with 34 minutes to the pound for the corresponding un-

seared loins.

The general appearance of the roasts which had been seared was somewhat better than that of the unseared roasts, the color being a richer brown, but in some cases the drippings from the seared loins were

rather dark for gravy of good color.

These results suggest that searing pork-loin roasts by the method used here improves the general appearance and saves time in cooking but does not decrease the cooking losses. In fact, the cooking losses are increased with searing. This increase appears to be due mainly to the rendering out of more fat into the drippings. These results indicate that pork loin can be successfully roasted, without searing, at a constant, moderate, oven temperature of from 320° to 350° F.

NANCY GRISWOLD CLARK, Bureau of Animal Industry.

POTATO Seed Quality Improved by Tuber-Index Method of Selection The improvement of the quality of seed potatoes through selective methods has long engaged the attention of the investigator as well as that of

the progressive potato grower. As a natural result of such study, various methods have been evolved having for their object the selection of strains producing tubers of greater uniformity in size and shape and at the same time of greater yielding capacity. The successive

steps in this evolution have been as follows:

(1) Mass selection of tubers either from the bin or from individually selected plants harvested separately and then thrown together and planted in a seed plot. (2) Hill selection, consisting of the selection of superior looking plants, followed by a second selection, when the plants are harvested, based on yield and uniformity of tubers. The tubers from each selected plant are kept separate and planted in progeny rows. (3) The tuber-unit method, by which each individual tuber from either mass selection or hill selection is cut into four parts, which are planted consecutively in the row.

These methods had as their primary object the isolation of promising strains of seed. In most cases, however, they accomplished another object oftentimes not premeditated by the investigator, namely,

elimination of disease.

With the increasing importance of virus diseases as an obstacle to the production of certified seed potatoes, a more certain means of eliminating tuber-borne diseases has become necessary, and as a result the tuber-index method<sup>2</sup> has been evolved. Briefly stated, this method consists in removing and growing a seed piece from each individually numbered tuber selected from some given stock from which it is desired to eliminate as far as possible all tuber-borne diseases, especially those of a virus nature. (Fig. 105.) During the early stages of

their growth the plants produced from these individual seed pieces are carefully observed for the presence of mosaic and other virus diseases. As each plant carries the number of the tuber from which the seed piece was removed, it is easy to discard the diseased tuber. All tubers from which the tested seed piece produced a healthy plant are used in the planting of a well-isolated seed plot. Usually they are planted on the tuber-unit basis in order to make it easier to

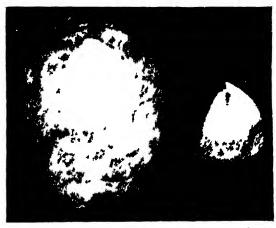


Fig. LRE 105 — Method of removing seed piece from potato tuber to determine prosence or absence of disease. The small seed piece is either potted or planted out and grown for observation.

detect the presence of any diseased ones that may have escaped observation in the preliminary test

#### Two Ways of Applying the Method

It is possible to take advantage of this method of tuber-disease detection under two distinct conditions. The first is that of potting the seed pieces into 4 or 5 inch pots and growing them in the greenhouse. By this practice it is possible to carry through several sets of

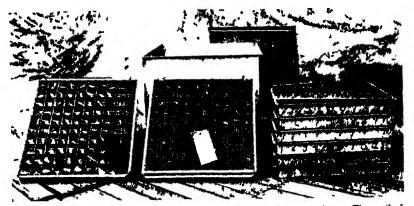


FIGURE 106 — Method of germinating successive lots of potato seed pieces in travs. This method increases the capacity when greenhouse space is limited. The seed pieces are covered with sand or soil (Photograph furnished by H. O. Werner, Nebraska Agricultur il Experiment Station)

plants in the same bench space during the winter months. Growers following this practice and utilizing their greenhouse space to the best possible advantage are resorting to chemical treatment of the seed pieces to hasten germination. In this way it is possible to begin tuber-index studies shortly after the tubers are harvested.

Tuber indexing seed-potato stocks in advance of date of planting has now become a precertification requirement in some States. Where such conditions are imposed on the would-be grower of certified seed he is obliged to submit a representative sample of his seed stock for indexing by those in charge of the certification work. If the test shows the presence of too large a percentage of disease he is advised to discard it and purchase some recommended stock.

The Wisconsin, Minnesota, Nebraska, and Montana Agricultural Experiment Stations are making most extensive use of the greenhouse

for tuber-index studies. (Figs. 106 and 107.)

The second condition under which tuber indexing may be conducted is that of planting the removed seed pieces in the open field. Such indexing may be conducted in all regions where first and second early potato crops can be grown; roughly speaking, from southern New Jersey to Florida and southwest to the Pacific coast.



FIGURE 107—Germinated potato seed pieces removed from trave prior to being potted or planted in benches (Photograph furnished by H O Werner, Nebraska Agricultural Experiment Station)

Most of the States engaged in greenhouse tuber-index work have taken advantage of the field-indexing of seed stock by shipping samples of seed to the South and making their disease readings at some propitious time during the growing season. During the winters of 1929–30 and 1930–31 the Division of Horticultural Crops and Diseases has indexed many thousands of tubers in the South.

# Readings Dependent on Climatic Conditions

Satisfactory outdoor disease readings are largely dependent on climatic conditions. If the weather and soil conditions are favorable much more accurate observations are possible than if reverse conditions prevail. Field indexing has an advantage over greenhouse studies in that it is possible to test large numbers of tubers at a relatively low cost and to continue the observations throughout the full growing period of the plants, thus making the detection and elimination of the spindle-tuber disease more certain.

Until varieties resistant or immune to virus diseases have been developed, the tuber-index method offers the most reliable known

means of eliminating tuber-borne diseases.

WILLIAM STUART, Bureau of Plant Industry.

POULTRY Experiments
Show Value of Alfalfa
Meals in Chick Ration

The number of poultry in the United States has increased greatly in the last decade, and with the increase have come many new problems in manage-

ment. Formerly, most poultry were kept as a sideline on general farms and usually compelled to forage for feed. Under the free-range conditions generally used, sufficient green feed was available except

during the winter.

An entirely different situation exists to-day. Numerous farms are devoted entirely to poultry keeping, and the tendency is to confine the birds to limited areas. When a bare range is provided, or when battery brooding or the confinement method of management is used, it is usually advantageous to supply fresh green feed or a green-feed substitute.

In view of the recognized importance of vitamins in nutrition, much emphasis has been placed on the vitamin content of feedstuffs. The necessity for some source of vitamin A in a ration for chicks is illus-

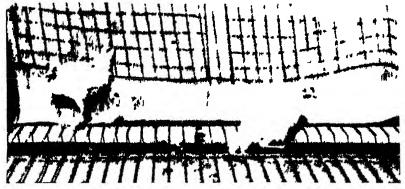


FIGURE 108 —Chickens 20 weeks old which had received a ration deficient in vitamin A

trated in the accompanying photographs taken at the United States Poultry Experiment Station, Glendale, Ariz. The chickens were all 20 weeks old when the photographs were taken. The two chickens in Figure 108 were the survivors of a group of 38 which had been fed a basal ration deficient in vitamin A. In Figure 109 are shown 5 chickens from a group which had been fed the same deficient basal ration, plus fresh alfalfa. The mortality in this group receiving fresh alfalfa was slight and, as illustrated, the growth of these chickens was much greater than that of the group which received only the basal ration.

#### Kinds of Alfalfa Meals

When poultry are raised under intensive conditions it is often not possible to furnish them with fresh green feed, even during the summer. The inclusion, in the mash, of meals made from the alfalfa plant is becoming popular and several investigators have demonstrated that meals made from the fresh entire alfalfa plant, alfalfa leaves, and alfalfa hay can be used advantageously in rations for laying hens. Few trials have been conducted in which those products were compared in the rations of young chickens.

Meals made from alfalfa are commonly recommended as a part of poultry rations, but usually not enough emphasis has been placed upon the differences which may exist among different meals. Rain damage and improper curing are often indicated by a loss of green coloring matter. Meals which have been damaged in such ways usually are yellowish in color. The age of a meal also is often indicated by its color, since the green coloring matter changes to a yellowish green as the meal becomes older. In general, two kinds of meal are made from alfalfa. One, called alfalfa meal, is made from the entire harvested plant; the other, called alfalfa-leaf meal or alfalfa leaf and blossom meal, contains more leaves and fewer stems. Alfalfa meals have lower protein and higher fiber contents than the alfalfa-leaf meals or the alfalfa leaf and blossom meals.



FIGURE 109 —Chickens 20 weeks old which had received a ration deficient in vitamin A, plus fresh alfalfa

A series of experiments was conducted at the United States Poultry Experiment Station to compare alfalfa meal, alfalfa-leaf meal, and fresh alfalfa as sources of vitamin A in a ration for chicks. The basal ration used was deficient in vitamin A, and measured amounts of the different supplements were used for different groups. In the trials, fresh alfalfa was found to be superior to either alfalfa meal or alfalfa-leaf meal when used as the sole source of vitamin A.

Inasmuch as it is often not possible or practicable to feed fresh alfalfa to growing chicks, the most applicable comparisons were those between the groups receiving alfalfa-leaf meal and the groups receiving alfalfa meal. Growth and livability of the chicks were the bases for comparisons, and the alfalfa-leaf meal gave much better results than the alfalfa meal. In fact, the alfalfa meal was practically valueless with the basal ration used.

#### Suggested Quantities in Rations

In accordance with the results obtained, it can be recommended that fresh alfalfa be fed to chicks whenever it is available, and that alfalfaleaf meal, preferably with a rich green color, be used as a source of vitamin A when fresh alfalfa can not be obtained.

How much alfalfa-leaf meal should be used in a ration for chicks? The proper quantity will vary in proportion to the quantity of other sources of vitamin A in the ration. When other good vitamin A sources, such as yellow corn, are used freely, as little as 2.5 per cent may be used. In other rations, from 5 to 7 5 per cent of the mash ration should be alfalfa-leaf meal. In rations in which alfalfa-leaf meal is the only source of vitamin A, this meal should constitute about 10 per cent of the total food intake.

The manufacture of dehydrated alfalfa meals is becoming more extensive. Briefly, the methods used consist in removing the moisture from fresh alfalfa soon after it is cut. Thus far, it has not been demonstrated that dehydrated meals are of more value in poultry rations than meals made from sun-cured alfalfa hay in sections where rain does not interfere with curing. Further experimental data must be obtained before any definite statements about the value of dehydrated alfalfa meals in poultry feeding can be made.

BURT W. HEYWANG, Bureau of Animal Industry.

POULTRY Lice Cause Heavy Losses Which Are Wholly Preventable

That poultry lice curtail production and profits is generally admitted The extent of loss naturally depends on the degree of infestation. Proba-

bly a few lice do little harm to mature poultry, but a few lice may soon become many lice, and young birds are more susceptible to louse attack than are mature ones. Some experiments carried out by the Bureau of Entomology a few years ago indicate that a moderately heavy infestation may cut egg production 15 per cent. That means a loss of millions of dollars to the poultry owners of this country. This loss is wholly preventable, and at low cost.

Many progressive commercial poultry raisers eliminate lice from their flocks or hold them under control. The owners of farm and back-yard flocks, however, usually pay little attention to these parasites, but con-

tinue to feed thousands of them year in and year out.

There are five different kinds of lice commonly found on chickens. These have somewhat different habits and some are more injurious than others. They have been given common names which indicate the part of the bird or its feathers, which they inhabit. The head louse is found principally on the head and neck and is the most injurious to young chicks and poultry. The body louse spends most of its life on the skin of mature chickens. It prefers places where the feathers are not too dense, such as below the vent, but on half-grown chickens it may be found in abundance on the back and neck. This louse infests turkeys and other fowls as well as chickens. It is one of the most widespread and injurious species. The shaft louse is present on different parts of the host, but is nearly always seen on the shaft of the body feathers. The wing louse is found mainly on the large wing feathers, but also occurs on the tail and neck feathers. It is less injurious than the species previously named. This is also true of the fluff louse, a slow-moving species which is usually found on the fluffy feathers of the body. Other kinds of lice are found on turkeys, geese, pigeons, and other fowls and birds.

### All Species Yield to Sodium Fluoride

Fortunately for the poultry raiser all these different kinds of lice can be destroyed by the treatment developed and recommended by the Bureau of Entomology—namely, the use of commercial sodium fluoride. This powder may be applied either as a dust or as a dip. In using it as a dust the "pinch method" is advised. This consists

In using it as a dust the "pinch method" is advised. This consists simply of putting about 12 pinches of the powder, as held between the thumb and foreinger, next to the skin on different parts of each bird.



Figure 110 —A single dipping of a fowl in sodium fluoride solution will kill all lice

The head, neck, back, breast, the part beneath the vent, the wings, and tail should each be treated.

Where more than 35 fowls are involved the dipping method is advised. A bright, warm day should be chosen for the work. The sodium fluoride is dissolved in water in the proportion of a heaping tablespoonful to each gallon. A tub is well filled with this solution and each bird is immersed for a few seconds. The bird is held in the dip by the wings with one hand, while with the other the feathers are raised to allow the solution to reach the skin. The head is ducked for an instant.

By either of these methods every louse and egg is killed. Thus by a single treatment of every fowl on the premises the lice may be eradicated. (Fig. 110.) The cost for ma-

terial is but a fraction of a cent per bird, as 1 pound of sodium fluoride will treat 100 hens by the pinch method and 200 by dipping.

Other materials may be used for combating poultry lice, but considering effectiveness, cost, and availability, sodium fluoride is recommended.

F. C. BISHOPP, Bureau of Entomology.

POULTRY Raising on a Very Intensive Scale Is Proving Practical The keeping of large numbers of chickens on one farm has developed to such an extent in this country that there are now battery brooding plants which will

accommodate many thousand chicks, laying houses with quarters for several thousand hens, and poultry farms of from 10,000 to 25,000 hen capacity. Much of the intensification has developed in the last few years since the use of cod-liver oil in the ration has enabled poultry men to keep both chickens and hens confined indoors without loss of vigor or health.

Brooding chicks in batteries, especially for the production of broilers, is the branch of this work which has been most intensively developed in recent years. Many types and sizes of batteries are in use, from small batteries holding 200 to 300 chicks to large units holding several thousand birds. All these batteries have wire floors which prevent the chickens from eating their droppings. This feature is important especially in the prevention and control of disease. Batteries are now operated in insulated rooms where the temperature, humidity, and ventilation are all artificially controlled so that uniform conditions may be maintained regardless of changes in the weather.

#### Sanitary Safeguards Are Features of the System

The use of battery brooders is advised for raising broilers and for raising all chicks where the soil is infected with disease germs. They are being used successfully on many farms for starting chicks even where there is no trouble with infected soil. Turkey poults are also brooded successfully in batteries. Long brooder houses in which the chicks are raised on the floors and which have small, outside, covered yards with either concrete, gravel, or wire bottoms, are also used successfully. Keeping the chicks away from the soil and giving careful attention to sanitation are important features in these methods of brooding.

Chickens that are to be kept longer than from 12 to 14 weeks will do much better and require less care if transferred to a clean range as soon as they no longer need artificial heat. The use of a cheap, portable, range shelter, made with a very low roof and wired sides and floor, is one of the recent improvements in the raising of good pullets. Even in producing broilers many poultry men start the chicks in the batteries, transfer them to brooder-house pens when they are from 6 to 8 weeks old, and then put them in fattening batteries for two or

three weeks before the broilers are marketed.

Chickens that are brooded in large numbers indoors require very careful management. Deformed and twisted legs are common defects in chicks raised in battery brooders and these defects are not prevented by the use of cod-liver oil. This department has found, however, that the use of 10 per cent of rice bran in the ration is very helpful in growing battery-brooder chicks free from leg trouble. Reducing the amount of corn meal and increasing the wheat bran in the ration have helped in some cases to prevent leg trouble and also to cause

better feather growth.

Overcrowding is the cause of much loss in battery brooding, since batteries large enough for starting the chicks become greatly overcrowded after the chicks are a few weeks old. The fact that a chick triples in weight between 4 and 8 weeks of age makes it easy to understand why overcrowding is a common trouble in battery brooding. Chicks often pick one another when in these batteries, causing heavy losses in the brooder as well as poor quality in the market chickens. Keeping the brooder houses slightly dark and using ruby-colored lights in the pens have been reported as being helpful in preventing this trouble.

Multiple-Story Laying Houses

Laying houses from two to six stories in height, with a capacity of several thousand hens, have replaced the common type of long single-

story houses on a number of poultry farms. The birds are kept confined in these large houses and are never on the ground after they go into the houses as pullets in the fall. Since hens on large poultry farms are usually confined most of the year even in 1-story houses, larger houses do not involve any radical change in management. Codliver oil is used in the ration to insure an adequate supply of vitamin A and the sunshine vitamin, D. The windows are arranged to allow the maximum amount of sunlight to shine directly into the house. These large houses reduce labor costs, and the birds are less affected by changes in the weather than they would be in small houses. In many cases large barns (fig. 111) have been remodeled into multiple-story laying houses.

The successful management of these apartment poultry houses requires close observation since even slight neglect may result in heavy

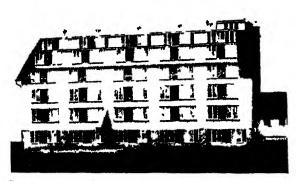


FIGURE 111.—Dairy barn remodeled into a large, 6-story poultry house

losses in the flock. The ration must contain all the essential ingredients, properly balanced, because the hens have no chance to supplement their feed with greens, minerals, or grain commonly found on range. In one of the department's experiments the use of a slightly deficient diet gave fairly good egg production with hens on

range, while the same ration fed to hens confined to the house produced only a few eggs per hen.

Ventilation of a large poultry house requires the use of a mechanical ventilating system. Many of the houses are insulated and heat is being provided in some. All large poultry houses must be kept absolutely clean and sanitary. These large hen houses probably will increase in number as more information is obtained on feeding the hens, on ventilating and heating the buildings, and on the control of picking which has been a cause of much loss where hens are confined.

ALFRED R. LEE, Bureau of Animal Industry.

PREDATORY-ANIMAL and Rodent Control to be Conducted Under a 10-year Program

After working more than 15 years in the control of predatory animals and injurious rodents on the public domain

and elsewhere in cooperative undertakings, the Bureau of Biological Survey has been authorized by Congress to conduct the work on a 10-year program. The new act, approved on March 2, 1931, will permit the bureau, when funds are provided, to do more effective work along lines already organized rather than to stimulate new lines of control. The law was passed only after careful consideration and public hearings, in which expression of divergent views was given by

many interested. Its passage should therefore set at rest any doubts that remain as to whether the control operations of the Biological

Survey as now conducted deserve public approval.

Wolves, coyotes, mountain lions, and bobcats every year destroy large numbers of livestock and game, and the coyote at times also serves as a carrier of rabies, or hydrophobia. The economically injurious rodents, such as prairie dogs, ground squirrels, pocket gophers, jack rabbits, porcupines, rats, and field mice, not only destroy growing and stored crops, forest and other nursery stock, and much of the range grasses that should support the farming and livestock industries but in some cases also spread such diseases of man as spotted fever (by ground squirrels), tularemia (by rabbits), and bubonic plague (by rats and ground squirrels). Control of both groups of these economic wasters of the individual farmer's efforts is necessary in the interests of agriculture, horticulture, forestry, animal husbandry, and wild game.

The settler who saw the profits of his hard work wiped out by the incursions of predatory animals into his stock ranges, and of rodents into his cultivated fields, had no recourse other than to ask aid of the Government whose lands served as breeding reservoirs from which these destroyers kept coming. Uncontrolled, they would reinfest his stocked and cultivated acres in spite of all that he could do, either single handed or with the aid of his neighbors. To effect some measure of relief, he and his neighbors resorted to the use of steel traps, rifles, poisons, and trained dogs. The appeals they later made to the Federal Government for aid in suppressing predators and rodents on the public domain led to the first cooperative Federal efforts toward control.

### Many Bounty Laws Repealed

Prior to the Federal Government's entry into the cooperative control program, the desultory warfare against these animals had included the payment of bounties, a premium on the heads of the predators, to stimulate individual activity in their control. Bounty laws have continued in effect more or less to the present, though within the past 15 or 20 years many of them have been repealed, because it was found that they encouraged only sporadic efforts toward control and were productive of fraud. Since that time the steady growth of correlation of Federal, State, and local efforts has resulted in the development of more efficient control measures and, when such measures are applied, in increased safeguards for beneficial forms of wild life.

Since 1915 the leadership of the Bureau of Biological Survey in predator and rodent control has been requested and encouraged by State and other cooperating agencies, and the funds made available from such sources for expenditure under the direction of this Federal agency have in recent years been far in excess of those provided for the purpose

from the National Treasury.

Research studies of the geographic distribution and relationships of the wild birds and mammals of the country, and field studies of their food and other habits, have been conducted by the Biological Survey for almost half a century, and these investigations have provided the basis of the control work carried on. Scientifically trained men are continuing research along these lines as funds permit, both in the field and in the laboratory.

The legal sanction for control work by the Federal Government is contained in congressional direction in annual appropriation acts for

the Department of Agriculture. These provide for investigations, experiments, demonstrations, and cooperation for the control of wild animals that become economically injurious, and for the suppression of rabies in predatory animals. The special program of control, which was called for by the Seventieth Congress, was authorized by the Seventy-first Congress as drawn up by the Department of Agriculture to cover a 10-year period.

#### Federal, State, and Local Cooperation Provided

The 10-year program contemplates continued cooperation between Federal, State, and local agencies, with a view to avoiding duplication of work and insuring the largest possible return from such funds as are provided. The Bureau of Biological Survey will continue cooperation with the Office of Cooperative Extension Work, the extension-service organizations, including colleges and county agricultural agents, and with State departments of agriculture, county commissioners, game commissions, and various agricultural, horticultural, and livestock organizations. In the work on Federal lands, the 10-year program contemplates close cooperation with the Forest Service, the Indian Service, and with other agencies, as necessity arises.

There are at present more than 16,000,000 acres of rodent-infested lands within the national forests. The greater portion of these infested lands is thickly populated with prairie dogs and ground squirrels. Experiments and observations over a long period have demonstrated that prairie dogs will destroy from 20 to 80 per cent of the succulent forage grasses about their towns. The 10-year program contemplates, in cooperation with the Forest Service, a thorough control of rodents where it has been determined that they materially lessen production on forest

grazing areas.

In many of the Eastern States also rodent-control work is necessary. The additional funds to be provided under the program will permit Biological Survey leadership in organized campaigns against such rodents as cotton rats in the South, pine mice and pocket gophers, and the common brown rat, which is probably the most destructive of all animals.

Within the past several years the coyote, one of the most persistent of the larger predators, has made its appearance in New York, Alabama, Georgia, Florida, Maryland, and Tennessee. From what source

it has come is a moot question.

In Alabama, the coyote was introduced by fox hunters in mistake for fox pups, according to reports. In other instances possibly the source of infestation has been tourists returning from vacation lands in the western country and bringing young coyotes with them as pets. These in turn, escaping from their owners, revert to the wild and establish themselves in their new homes. In every case where the coyote has recently made its appearance in the East and South, complaints have been registered against its depredations, particularly on calves, sheep, hogs, and poultry.

In middle Tennessee, for instance, a petition for aid, signed by 18 farmers, showed a loss of 131 lambs, 56 ewes, and 1 goat. An expert hunter was assigned to this area under a cooperative agreement with Hickman and Maury Counties, and he succeeded in eliminating the demonstrated coyote infestation that was in existence, thus alleviating

the loss these farmers had been sustaining.

The 10-year program contemplates control of predators on public domain to an extent that will reduce to the minimum the infestation on adjacent livestock-grazing areas. Under present conditions, such control is not possible because of reinvasions from a constantly renewed source of supply. Much has been accomplished during the last 15 years, but the degree of control that is desired has not been attained, and reinfestations of cleared areas are constantly occurring. The authorization of the 10-year program and provision of the funds contemplated should be an aid in more adequately controlling injurious mammals.

STANLEY P. YOUNG, Bureau of Biological Survey.

RADIO Correlation
Arranged by Federal
and State Agencies

Correlation of the information broadcasting of the Department of Agriculture and the State land-grant institutions, a development toward which the

Radio Service has been looking for three years, became a reality during the last year and will be effective on a nation-wide scale during 1932.

Under the new system, information from the Department of Agriculture will be adapted and supplemented by the State extension services, which under the Smith-Lever Act of 1914 are operated by the land-grant colleges and universities. Thus, the information resources of the land-grant institutions and of the department will be pooled in order to bring out the most timely and useful information available, and information which will be of greatest interest to farm people in particular regions.

The plan for correlation had its inception in 1928, when the Radio Service was invited by the radio committee of the Association of Land Grant Colleges and Universities to cooperate in working out a system for correlating Federal and State broadcasting. At that time, it was proposed to correlate only the daily agricultural syndicate programs, which are sent in mimeographed form to individual stations upon request. The present plan is more inclusive. It contemplates State participation, also, in the network program of the department and in

the home-economics syndicate service.

The general proposal for correlation of agricultural syndicate programs is that half of the material will be prepared by the department and half by the State extension services, to make a 15-minute, 6-days-a-week program. Naturally, the details of the proposal have been modified to meet varying conditions within States. The general proposal also contemplates that the material be supplemented by county extension agents, in order to give it the maximum local interest and adaptability. Also, that the program be presented by county extension agents whenever possible, thus providing authoritative speakers.

The home-economics syndicate service will be correlated in a similar way. The Housekeepers' Chats, which have been popular features on radio stations throughout the country for six years, will be sent to cooperating State extension services for adaptation and supplement-

ing.

The proposal for State participation in the national farm and home hour—now broadcast over a network of 45 stations associated with the

National Broadcasting Co.—calls for setting aside a daily 5-minute period for the use of State extension services. At the end of the year, this proposal is awaiting completion of a canvass of the States to

determine their desires.

Detailed proposals have been submitted to 33 States this year, by the Directors of Extension and Information of the Department of Agriculture. The remaining 15 States are to be contacted as early as possible in 1932, so that the correlated system can be put in operation on a country-wide basis during the year.

Of the 33 States contacted, 22 are ready to handle at least one of the correlated services at the beginning of the new year. Five others have

not yet definitely formulated their broadcasting plans.

The Radio Service plans to issue the first material in the new correlated agricultural syndicate service for release January 18, 1932. At least 19 States will be cooperating in the service at that time, with the possibility that seven more, now undecided, will be added to the list before the starting date.

ALAN DAILEY, Radio Service.

RADIO Preferences of Farmers Indicated by Sixteen Test Programs

Farmers are jealous of their radio time. They demand that agricultural or informational programs be easy to listen to, and easy to understand and

remember. But they want the subject matter concise and definite, concrete and specific. They resent the inclusion of anything which serves as a distraction from the information itself.

These are the main conclusions gathered from reports of farmer-listeners who gave their judgment on a series of 16 experimental broadcasts presented by the Radio Service of the Department of Agriculture in cooperation with Station WGY of Schenectady, N. Y. Further analysis of those reports, however, gives us considerable insight into what makes for easy listening and ready understanding in a radio

program.

In each of the test programs, the same agricultural subject matter was given in two forms and the farmers who volunteered to listen and report were asked to choose between the two and give reasons for their preference. In each case, one of the forms was always the narrative style used by the department in its regular Farm Flashes over Station WGY, and was immediately followed by the same information prepared in another style; for example, the usual news-story style. Each test was repeated a month later but with different subject matter

prepared by a different writer.

Tabulation of farmers' reports on the entire series of 16 different broadcasts covering nine different styles of presentation shows that programs prepared in the form of a news-story, as a logically outlined public speech, as a sales talk, as a talk interlarded with jokes and humorous verse, in the form of a fable, and as a narrative, were each less popular with farmer listeners than were the programs written in the form of experience reports from different farmers, those prepared in the form of simple questions and answers, those in a style requiring listener participation by the use of paper and pencil for taking notes and drawing simple charts, or those in a style in which special care was taken to state minor details in specific, concrete terms.

The reasons given by the listening farmers for their preferences are most illuminating. Running through the whole series of reports is a chain of comments which show that one of the best ways to get and hold farmer interest is to talk to him in straightforward, sincere, informal, friendly farmer fashion, and to talk to him about what other farmers have actually done on their farms.

The real is preferred to the abstract or the fictional. And the strong preference shown for the programs containing many specific details appears to be based on the fact that such details help create the illusion

of solid reality in the mind of the listener.

It also appears from these farmer votes and opinions that the span of listener attention is very short. Smoothly running talks are evidently not as easy to understand or as effective as those which are broken up and the attention repeatedly brought to a new focus by question and answer or other such devices.

The favorable comments on the talk requiring the use of pencil and notes show that listeners feel a real need for memory helps and indicate that radio writers and speakers should give more attention to provid-

ing such helps.

C. A. HERNDON, Radio Service.

REFORESTATION Work in Lake States Aided by Knutson-Vandenberg Act

Reforestation work in the Lake States has been given a decided impetus by the Knutson-Vandenberg Act, approved June 9, 1930.

Planting work on the national forests in the region may be completed

in from 30 to 40 years. instead of 120 years, as a result of its passage Some 1,200,000 acres of idle land in Michigan, Wisconsin, and Minnesota, best suited for timber production. will thus be put to work growing wood in about 25 per cent of the time required under the previous authorization. Public sentiment demands an adequate planting program for this vast area of deforested lands, and the passage of more adequate forest crop laws to encourage reforesta-

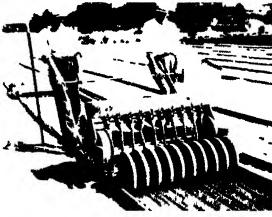


FIGURE 112—Drilling Norway pine seed at Beal nursery, Huron National Forest, Mich The drill, as well as other labor-saving devices developed by Planting Assistant H C. Turner, has resulted in a greatly reduced cost of production

tion by private owner reflects the leadership of the Federal Government.

Reforestation work in the Lake States is practicable at a relatively low cost. Seed extraction and nursery and planting technic have been developed by study, experimentation, and practice through the past 20 years. (Fig. 112.)

The Forest Service's seed-extraction plant at Cass Lake, Minn, has been enlarged and improved, resulting in a 20 to 30 per cent reduction in the cost of seed. This plant furnishes seed to the Federal nurseries, and supplies a considerable quantity at cost to States cooperating in distribution of trees for farm planting. During 1930, 5,693 pounds of Norway pine seed, 985 pounds of white pine seed, 13 pounds of jack pine seed, and 58 pounds of white spruce seed were extracted.

#### Nursery Capacity Increased

Nursery capacity is being increased to meet the enlarged planting program. Raising trees for planting under field conditions in the Lake States costs from 60 cents to \$1 per thousand, depending on the

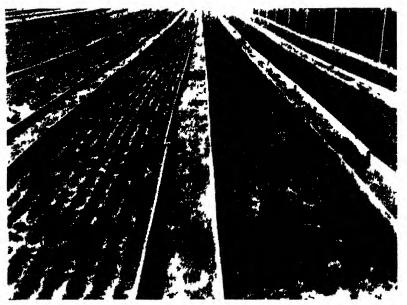


Fig. RE 113—Nursely beds at Beal nurserv—1-ye u-old secdlings in the foreground, and 2 year old seedlings in upper right-hand corner

annual capacity of the nursery, species of trees, water and soil conditions, etc. Two-year-old seedlings are usually raised, with no transplanting in the nursery except to produce special stock for experimental use or more sturdy stock for planting under rigorous site conditions.

The Beal nursery on the Huron National Forest, which is producing trees for planting on the national forests in Michigan, is now at capacity production of over 7,000,000 seedlings annually. (Fig. 113.) Cass Lake nursery on the Chippewa Forest is being expanded to an annual capacity of 4,000,000 seedlings, to be used on the national forests in Minnesota.

A new nursery at Rhinelander, Wis., will be in full production by the fall of 1933 with a capacity of 10,000,000 trees annually for planting on the national forests of Wisconsin and the upper peninsula of Michigan. The Rhinelander nursery was started in April, 1931, the site being donated by Oneida County. The Kiwanis organization of Wisconsin and upper Michigan is contributing \$10,000 toward its development. A

fourth nursery in this region will still be necessary to meet the expanded reforestation program.



Fig. 1 E 114 — Planting trees in furrows Note fire line in the foreground, and scrub oak now occupying the ground

In planting, furrows are plowed 8 teet apart, with tractor-drawn plows set just deep enough to cut and throw out a ribbon of sod. This furrow eliminates root competition from grass, bracken, and



FIGURE 115 - A successful plantation of Norway pine. Photo taken about six years after planting

shrubs. The seedlings are planted 8 feet apart in the furrows, 700 to each acre, by the use of the Michigan planting bar. (Fig. 114.)

Tractors plow 15 to 20 miles of turrow per day. A mile of furrow is equivalent to 1 acre of land. Each motion required in planting a tree has been carefully studied and all unnecessary work eliminated. A carefully trained, experienced planter will regularly plant 2,500 trees per day.

Total cost, from seed collection, through the nursery, to field planting, in 1930 averaged a little under \$3 per acre. A large part of the remaining area to be planted, however, consists of more difficult

planting site and the average cost will be somewhat higher.

Plantations are given special protection by the fire organizations on the national-forest units. Around each section is a 46-loot cleared fire line, constructed with heavy machinery. (Fig. 115)

H. BASIL WALES, Forest Service.

RENOVATED-BUTTER Industry
Declines With Decrease in
Production of Farm Butter

The manufacture of renovated butter was at one time an industry of considerable importance because of the

number of factories engaged in its manufacture and the volume of production. Within the last 15 years, however, the number of factories operating and the amount of renovated butter made have steadily declined. As shown in Table 6, 22 factories operating in 12 States made 27,542,015 pounds of renovated butter in 1917, whereas there were but 5 factories operating in 5 States in 1931 and they produced but 1,498,024 pounds of renovated butter.

Table 6—Number of renovated-butter factories operating in the United States in the fiscal years, 1917–1931, and the volume of production

Fiscal year	Reno- vated- butter States factories	Renovated butter made	Fiscal year	Reno- vated butter factories	States	Renovated butter made
1917 - 1918 - 1919 - 1920 - 1921 - 1922 - 1923 - 1924 -	Number Number 22 12 19 11 15 10 11 8 6 6 7 1	Pounds 27, 542, 015 19, 405, 672 16, 667, 155 9, 611, 675 6, 134, 034 5, 355, 363 4, 003, 403 4, 051, 463	1925 1926 1927 - 1928 1929 1930 1931	N u mber 7 6 6 6 5 5 5 5	Number 1 5 7 7 7	Pounds 3, 843, 516 2, 482, 530 4, 212, 306 3, 161, 090 3, 037, 618 1, 845, 366 1, 499, 021

In the renovating process the quality of the finished product is materially improved over that of the stock used. However, the finished product does not possess good keeping qualities and, scored on a quality basis, is inferior to good creamery butter. Its use as a table butter has been largely superseded in the last few years by use of good creamery butter, or of butter substitutes. At the present time renovated butter is used chiefly by the baking industry.

Renovated butter is a taxable product. Its manufacturers are required by law to operate under licenses. The proper branding and labeling of all renovated butter, whether made into prints or packed in tubs, as well as the enforcement of sanitary regulations and periodic inspection of all licensed renovated-butter factories, is administered and supervised by the Bureau of Dairy Industry. Reports are sent to

this bureau by the Meat Inspection Division of the Bureau of Animal Industry, representatives of which make at least weekly inspections. Inspection trips are made to these factories by a Bureau of Dairy Industry representative at least twice a year. All cartons and parchment wrappers for renovated butter must be approved by the Secretary of Agriculture. When the product is solidly packed in quantities of 10 pounds or more it must, in every case, be marked on the surface with the words "Renovated Butter," or "Process Butter," in letters not less than one-half inch square, of Gothic style and depressed not less than one-eighth of an inch. It must be similarly marked when sold in print or roll form. The wrapper and carton must be labeled in letters

three-eighths of an inch square.

The fact that the dairy farmer generally receives more money for butterfat sold to creameries in the form of cream than for butterfat sold to the country store in the form of dairy butter, shows a desirable trend in rural dairy conditions. The marked decrease in the amount of butter made on the farm and the resultant shortage of packing-stock butter, from which renovated butter is largely made, is undoubtedly the principal factor in the decline of the renovated-butter industry. The poor quality of available packing stock, the natural prejudice against a renovated product, the general improvement in quality of creamery butter, and the increased use of butter substitutes have all contributed to a lessened demand for this product and to the decrease in the amount manufactured.

CHAS. S. TRIMBLE, Bureau of Dairy Industry.

OAD Building on Secondary or Local **▲** Projects is Progressing

When people speak of farm-to-market roads it is never clear just what kind of roads they mean, and what other kinds of roads there may be that are not prop-

erly to be described as farm-to-market roads. Such references are especially puzzling to those who have thought of all rural roads as farmto-market roads.

To be sure there are some roads that serve little traffic except that which originates largely on the farms; and some that carry, in addition to the farm traffic, a heavy intercity movement of vehicles. There are some whose total traffic, without regard to character, is light; and others that carry a tremendous traffic; and, by and large, it may be observed that the roads that serve the heaviest total traffic—which are the principal intercity roads—are likely to serve also the heaviest farm traffic, and are, therefore, the most important farm-to-market roads. (Fig. 116.)

Certainly, it is true that the farmers' markets—for buying as well as selling—are in the cities; and the bigger the city the better the market. It appears that the principal distinction to be drawn between roads is one of importance rather than of kind. So, when someone says that, "really we shall have to do something about the farm-to-market roads, we can conclude that what he actually means is that it is time now to be doing something more effective for the improvement of the less important roads, the local or secondary roads as they are called. And so it is.

It is time to extend to the secondary or local roads some more effective improvement; and the time has arrived when that more effective improvement will be extended. It not only will be done; it is being

done, and the process is already well advanced.

There are very definite reasons why progress in the improvement of the secondary roads under the supervision of the local authorities has been slow in the past.

## Local Planning Not Systematic

First, there has been a lack of order and plan in the efforts of the local authorities, and their organization and equipment for the work have been seriously deficient. How many people realize that nearly half of the more than 3,000 counties in the United States are trying to build roads without any engineering direction whatever, and with none but the most primitive road-building equipment? That is a fact; and it is also a fact that, of those counties that do have at least the most



Fig. RE 116.—Farm-to-market traffic on a State highway

essential equipment and the basis of an engineering organization, not more than half again are really adequately equipped and organized to

handle the difficult task of building roads for modern traffic.

Thus poorly equipped, these counties have been trying, year after year, to improve all their local roads, spreading their slender revenues over a mileage so great that the slight benefits of each year's work have been lost by the beginning of the next road-building season. That is one of the reasons why progress in the improvement of the local roads has not kept pace with the more orderly improvement of the main roads by the State and Federal Governments. But a movement is under way, and already well advanced, the effects of which will soon be evident in a very material improvement of the condition of the local roads. That movement is the steady enlargement of the systems of State and Federal aid roads, which in recent years has been taking place more rapidly than most people realize.

In the selection of the roads that make up these systems, the Federal and State Governments have wisely avoided the mistake of the county

and township authorities. They have limited the extent of the systems to the mileage that could be improved as a whole in a reasonable length of time. The roads chosen have been the most important roads; and together they form a connected network that covers the entire country.

### Limitation of Federal Aid System

The Federal law limited the size of the Federal aid system to 7 per cent of the total mileage of roads with the definite purpose of preventing the wasteful scattering of the national appropriations; but it provided that when this limited mileage had been improved other roads could be added.

In six States the mileage selected under the original 7 per cent limitation has already been improved and the size of the system has been increased by adding other roads; a similar extension will soon be

possible in a number of other States.

In a similar manner and for the same reason, the States have limited the initial mileage of their State systems. But they, also, have found it possible from time to time to add to the extent of these systems. Between 1921 and 1930 they took over from the counties more than 120,000 miles, and there is no doubt that they will continue to take over additional mileage as rapidly as that already taken is improved.

This process of gradually increasing the size of the Federal aid and State highway systems is having two effects: (1) It brings under the control of the well-equipped Federal and State highway departments mile after mile of the more important county roads and insures that they will be improved as their importance demands; (2) the roads taken over, being the more heavily traveled county highways, are those which have required the largest expenditure. Relieved of them, the counties are able, without increase of local taxes, to expend a larger sum per mile on the remaining mileage and so to effect a more lasting improvement.

### Revenue From Road Users

This, then, is one way in which Federal and State improvement of the principal highways—all of them farm-to-market roads—is brightening the prospect for more rapid local road improvement. There is another result of this orderly development that works in the same direction. The improvement of the main roads alone has made possible the great increase in the number of motor vehicles in use. The high class of service afforded to these motor vehicles by the improved main roads has made the owners of the vehicles willing and able to pay ever-increasing sums for road construction and maintenance.

Between 1921 and 1930 the amount of this payment by the owners of motor vehicles increased from \$127,000,000 to \$850,000,000. The portion of these increasing funds that has gone into the State treasuries has provided the means for taking over from the counties an increasing mileage of the more heavily traveled local roads that have been the counties' greatest burdens. But while the local governments have thus profited indirectly, they have also shared directly in these increased earnings of the main roads; for the share of the motor-vehicle taxes paid directly to the counties has increased from \$22,000,000 in 1921 to \$165,000,000 in 1930.

The fact that the motor-vehicle owners, as a class, are the most willing of taxpayers, means that they feel that they are more than repaid by the road service they receive in return, and this return and consequent willing tax payment are primarily the result of the improve-

ment of the main roads.

This is the result of the wise policy of selecting for first improvement the most important roads. The improvement of these roads has earned a surplus above their cost of maintenance, which surplus it has been possible to use for the improvement of other roads in the order of their importance. Only by the orderly process that has been followed could this result have been achieved; and it is only by the extension of this same process that the roads of lesser importance can be progressively and adequately improved without laying an increasing tax burden upon real property and particularly upon farm property.

Less Expensive Types of Roads

There is one other development of the last three or four years that will speed the improvement of the local farm-to-market roads. That



FIGURE 117—A surface-treated sand-clay surface surtable for secondary roads which can be built at moderate cost

is the success that has attended the experiments that have been made over that period looking to the development of less expensive types of road surface suitable for the lighter traffic of these roads. (Fig. 117.) That success has been supplemented by the remarkable progress that has been made in the adaptation of labor and time saving machinery for the construction of such roads. By the use of such equipment for the building of the less ex-

pensive and yet entirely adequate types of roads that have been developed recently, it is going to be possible in the future to make the secondary-road dollar go farther and do more in the way of lasting

and serviceable improvement.

So, there is every assurance that the improvement of the farmers' market roads will go forward with even more rapid progress. The principal roads have already been improved by the Federal and State Governments. By their taking over of more and more of the important secondary roads which are the heaviest burden upon country finances, the task remaining for the counties will be greatly eased. The increased earnings of the main roads in taxes paid by motor-vehicle users will provide increasing revenues for the improvement of county as well as State roads; and by the use of the new methods of low-cost road construction the county revenues thus conserved and augmented will be used more efficiently and productively.

The future of the farm-to-market roads—all of them—has never been brighter. But in order that the results of future expenditures on those which remain under the control of the county and local authorities may

be as effective as possible, it is still desirable that there be a marked improvement in the organization and equipment of the local governing bodies.

## Engineering Supervision Essential

Particularly is it desirable that all local road work be carried on under engineering supervision. There may still linger in the minds of some people a feeling that roads can be built without technical direction. There was a time not so long ago when that opinion was entertained by many people. But the demonstration of the effectiveness of technical control which has been made in the improvement of the Federal-aid and State highway systems should have convinced most of the doubters.

However that may be, building roads for modern traffic can not be efficiently carried on without the highest type of technical direction obtainable; and that kind of direction the counties must endeavor to provide for the success of their local road programs—that and the neces-

sary equipment and plant which such direction will suggest.

It is probable that efficient technical supervision and adequate equipment will be obtainable in many cases only by the consolidation of several counties into larger administrative districts. This, for the reason that the overhead cost of the necessary supervision and plant would constitute too large a proportion of the total cost unless it were spread over a greater volume of work than many of the existing counties have to do.

By such consolidation of administrative control, and the employment of the efficient supervision and equipment which will thus be made possible; by following the orderly process of improving the roads in the order of their importance, after the example set by the National and State Governments; by these means will the work that must always remain under local control be brought to a high standard of efficiency. And such are the means by which the local farm-to-market roads will ultimately be raised to a state of improvement comparable with the present state of the primary roads.

THOMAS H. MACDONALD, Chief, Bureau of Public Roads.

ODENT-CONTROL Studies for the Different Species

The need for the control of ro-Develop Specific Methods dents has grown as agriculture has developed. The most important factor limiting rodent

abundance—that of seasonally scant food supply—has been removed in many areas for such species as have proved capable of accommodating themselves to changed conditions, and many of them early developed into first-class agricultural pests. Not only is their control necessary for economic reasons, but in some places because of consideration for human health. Examples of this are found in the bubonic-plague infestation over wide areas among the California ground squirrels as well as spotted fever among other ground squirrels in the Rocky Mountain region. Fortunately, an increasing knowledge of the animals' habits and of their physiological responses has made it possible for the Bureau of Biological Survery to develop methods of control that are constantly becoming more specific. Educational methods also are employed by the bureau to win the agricultural population to adopt newer methods in rodent control, in preference to the crude formulas and methods of application formerly in universal use.

Some years ago W. C. Jacobsen, of the California Department of Agriculture, made a study of the rodent problems in California and of efforts for their solution. The earliest community rodent-control project of which he found record was one conducted about the Santa Barbara Mission in 1808. Since that day settlers in California and in other Western States have found it necessary to resort to intensive campaigns, using every sort of device and agency to protect their crops

against the swarming hordes of rodents.

Poisons of various kinds were early used by farmers, some of the baits, in the light of present-day knowledge and practice, being of astonishing strength. Mixtures of 1 ounce of phosphorus to 6 pounds of wheat, and strychnine and cyanide combinations of almost the same proportionate strength, were rather widely used. Poisoned water also was used in some localities with deadly effect, not only on ground squirrels but also on other forms of mammals as well as on birds. One astonishing formula printed in California in 1873 recommended 24 ounces of strychnine to 2 quarts of wheat. This is in startling contrast with the present-day proportions of 1 ounce of strychnine to 20 or more pounds of grain. Phosphorus was a favorite with many farmers because of its cheapness, despite the fact that occasional grain fires were almost certainly traced to its use.

About 1909, S. E. Piper, of the Biological Survey, began investigations of rodent damage, methods of reducing the losses, and the possibility of reducing the proportion of poison in the baits. His tests and those of many subsequent Biological Survey investigators have gradually established four important facts that have aided greatly in making poison formulas more specific against such rodents as become pests:

(1) Animals, including birds, show a great variation in their resistance to any poison; long before it was demonstrated in laboratory tests, control workers knew in a general way that it was much more difficult to poison birds than mammals. (2) Mammals, even races of the same species, show a constant variation in resistance, which can be utilized to advantage in selective control. (3) Sufficent variation exists in choice of food and in manner of feeding among various species to make utilization of these factors feasible in control work, including seasonal and territorial change of baits. (4) In some localities poisons that are effective at one season are ineffective at others, possibly because of food interference with the lethal action.

## Some Birds Practically Immune to Strychnine

An example of the first point is found in gallinaceous birds, whose tolerance to strychnine is so high as to amount to practical immunity from its effects. This fact has been demonstrated time and again by feeding tests on quail, domestic chickens, pheasants, and others, and the results made available in a mimeographed leaflet (Bi-1028) of the Bureau of Biological Survey. Pigeons and doves also show the same resistance to strychnine, though in a lesser degree. The lethal dose of strychnine for these birds is approximately four times as great per unit of body weight as in the case of ground squirrels. Other birds also show higher resistance to other poisons than do the mammals commonly classed as pests. Obviously weakening the formula by spreading the poison over greater quantities of bait material would operate to the advantage of the resistant groups. For example, the old phosphorus formula required only two or three kernels of wheat to kill the average

pigeon; in the strong strychnine mixtures of the early days 20 to 40 kernels would be sufficient; while in formulas recommended at present a lethal dose requires about 100 kernels. Where poison is distributed in small baits intended for the less-resistant forms, as ground mammals, it is apparent that the chances of an individual bird picking up 100 kernels of grain are much less than of its getting 2 or 20 or 40.

The difference in resistance to poison by closely related forms of animals, even of races of one species, is exemplified in Douglas's ground squirrel (Citellus douglasi) of northern California and western Oregon. This rodent is easily susceptible to strychnine, while in California south of the San Francisco Bay region the nearly related California ground

squirrel (C. beecheyi) is one of the most resistant.

In Montana, northern Idaho, and eastern Washington the Columbia ground squirrel (Citellus columbianus) is one of the most difficult to handle. Strychnine is much less effective against this rodent in this territory than in northeastern Oregon, and for many years this was not understood. In 1928, when the species was divided into two races, the line of demarcation followed closely the boundary that had been noted

in the differences in reactions to poison.

Curiously enough, the Columbia ground squirrel and the Oregon ground squirrel (Citellus oregonus), which are found more or less closely associated in northeastern Oregon, have such a marked difference in susceptibility to strychnine that it is possible to prepare a grain mixture to kill the latter without harming more than a very small percentage of the Columbia squirrels, even though these may feed freely on the bait. This fact complicates control of the Columbia squirrel with bait intended for use against the Oregon species.

### Food Preferences Utilized

An example of the third point is found in the fact that small birds have been found in a majority of tests to prefer wheat to barley or oats, while ground squirrels of several species prefer the coarser grains to the wheat. Advantage has been taken of this, and as a result wheat has been gradually eliminated as a bait material, despite the fact that at the time organized study of the control problem began, it was the bait most widely recommended and used for rodent control. Many tests repeated at various seasons over wide territory have demonstrated this habit of discrimination to be general, even though occasionally the squirrels will eat one grain as readily as another, and less frequently small birds will not display any selectivity even though given a choice.

The development of pouch poisons for ground squirrels as opposed to stomach poisons is another and outstanding example of increasing efficiency in control through taking advantage of the rodents' manner of handling foods. Baits can be prepared in such manner as to release poisons in the mouth and thus kill ground squirrels that pick up quantities of the grain in their cheek pouches, rather than await the much slower absorption through the stomach. Consequently smaller proportions of poisons than previously were thought necessary are now used

in the baits.

Neither pouch nor stomach poisons, however, are particularly effective against the Columbia ground squirrel because this species does not often pouch or eat sufficient grain without hulling it to carry a killing dose. Successful control of this species has been obtained by preparing a coated bait with flour paste, which is brittle and easily flakes off in the mouth as the grain is hulled.

The California ground squirrel furnishes the outstanding example of seasonal variation in response to poison. During the summer and fall months pouch poisons carrying strychnine as the lethal agent are quite generally successful. Spring operations are markedly less so, yet other poisons substituted for strychnine at this season are satisfactory. Variations in feeding habits and character of foods taken, and perhaps food interference with the action of poisons, play a part in producing this state of affairs.

Much educational work on the part of the Biological Survey has been necessary to teach the desirability of undertaking control not only at the proper season but also on a community and crew basis. Organizing control work on a community-wide basis accomplishes two things: It reduces the possibility of reinfestation from one farm to another; and it greatly reduces the length of the poisoning season. Where the practice of covering a considerable territory at one time does not prevail, poison is commonly exposed by farmers at one point or another over a period of months. Formerly they would place handfuls here and there, on stumps, in logs, and at other places where the rodents might find it, sometimes many days later. For these sporadic practices there has been largely substituted the community method of scattering over a given area sufficient baits of grain directly at the entrances of the burrows of the rodent it is desired to kill, and doing this at a season when that animal is feeding on grain. This method normally results in a good rodent clean-up over the entire area treated and consequently in lessened necessity for further exposure of poisons during that season.

Poisoning has thus far proved to be the most effective method of dealing with rodent pests. Bounties have resulted either in fraud or in unprofitable expenditure of large sums of money. Guns, traps, and other mechanical devices are hopeless means of control in the face of the endless hordes of rodents always present. So-called viruses, such as those widely advertised for controlling rats, have never been satisfactory and, furthermore, are looked upon with disfavor by many health authorities as a possible source of spread of diseases to human beings. They have not been used in control campaigns conducted by

the Biological Survey.

Of fumigants for burrowing species, carbon bisulphide is the most satisfactory thus far employed. It has been widely used against California ground squirrels, in some places with great success. Though too expensive for practical use in heavy infestations, carbon bisulphide is valuable chiefly as a follow-up agent, where the rodent population has already been greatly reduced by poison. Calcium cyanide is useful as a fumigant to a certain degree, but it has not completely fulfilled the high hopes early held for it by control workers. Fumes of sulphur, gasooline, petroleum distillate, and kerosene also have been tried with varying success, but none of these substances has yet come into general use.

Poisoning and fumigating are the only known methods offering any possibility of satisfactory solution of the rodent-control problem, and of these, poisoning is the more practicable. Contrary to the opinion commonly held, it is possible, with our present knowledge of the characteristics of poisons and of the habits of animals, so to select, prepare, and expose baits as not seriously to endanger animals other than the rodents for which the poisons are intended. Ordinary precautions, of course, are always to be taken in handling any poison, so as not to endanger human beings, domestic stock, or valuable wild life.

RUBBER Plant Hybrids of Madagascar Species Prove Vigorous in U. S.

Hybrids of two species of Madagascar rubber vines, Cryptostegia madagascariensis and C. grandiflora, are being studied and propagated in

southern Florida. In the past a good grade of rubber known as "palay" has been obtained from the wild plants in Madagascar by

primitive methods. One of the species (C. madagascariensis) was introduced into Florida more than 30 years ago and has been planted extensively as an ornamental (fig. 118), while C. grandiflora has escaped from cultivation and become established in the West Indies and in many portions of Mexico. Plantings of both species have been made at several points in southern California and Arizona, and the plants have grown well for several years.



FIGURE 118 - A branch of Craptostegia flowers



FIGURE 119 - Cryptostegia grandiflora growing over a hedge near Gonaives, Haiti

The two species have been mistaken for each other and the names often are applied to the wrong plants. Yet the two are distinct and hardly to be confused once the real differences are recognized. The



FIGURE 120 —A plant of Cryptologia madagascariensis growing in Fort Myers, Fli

most striking of these differences are the type of growth and leaf characters, Cryptostegia grandiflora having a stronger tendency to grow as a trailing vine with long whiplike shoots (fig. 119) and broadly elliptical leaves with reddish midribs, while C. madagascariensis has narrower, firmer, and smoother leaves with white midribs. When grown on lawns or in

borders, the plants of the latter species usually are trimmed to a rounded form. (Fig. 120)

# Hybrids Show Increased Vigor

The hybrids are from seed from a single pod obtained from a plant of Cryptostegia grandiflora growing near Miami, Fla., in 1926. In growth they have shown a greater vigor than plants of either of the two parent species. They are of a strong whiplike type of growth (fig. 121), similar to that of C. grandiflora, but their leaves bear a closer resemblance to those of C. madagascariensis, and their floral characters are intermediate between those of the parent species.

Numerous analyses of the hybrids in comparison with the parent species have been made. In all com-



FIGURE 121 —Hybrid Cryptostegia plant growing on wall of plant shelter near Miami, Fla.

parisons the hybrids have had a higher percentage of rubber than either Cryptostegia grandiflora or C. madagascariensis, in addition to having a greater total yield, due to their increased growth. The mean rubber content of 20 plants in southern Florida remained nearly constant from September, 1930, through January, 1931, monthly analyses showing a mean of from 4.18 to 4.97 per centrubber. The highest individual rubber content recorded during this period was 6 98 per cent. The mean rubber content of 20 plants of C. madagascariensis analyzed monthly from August to December varied from 1.75 to 2.22 per cent, the highest individual rubber content being 3 51 per cent. The mean rubber content of 20 plants of C. grandiflora analyzed in August, September, and October varied from 1.63 to 1.90 per cent, the highest individual rubber content being 2.94 per cent.

In contrast with desert plants, which secrete less rubber under conditions of vigorous growth, the species of Cryptostegia yield a greater percentage of rubber under those conditions, and it appears probable that the higher rubber content of the hybrids may be connected with

their increased growth vigor.

LOREN G. POLHAMUS, Bureau of Plant Industry.

SEED-CORN Maggot Injury Avoided by Suberizing Potato Seed Pieces Before Planting Newly planted potato seed pieces of the early spring crop on the eastern coastal plain are often seriously injured by an insect

commonly known as the seed-corn maggot (*Hylemyia cilicrura* Rond.). This insect occurs throughout the temperate regions of North America and is known to attack a wide range of plants. In addition to the potato, sprouting seed and seedlings of corn, beans, spinach, cucumbers, turnips, melons, and peas are subject to attack. The adult of the maggot is a fly smaller than the house fly and grayish in color. The female deposits the eggs in the soil, and the maggots develop from these.

Injury to potato seed pieces results from holes or tunnels cut into the potato by the maggot during feeding. The feeding always begins at some spot on the cut surface of the potato seed piece, as the maggot never attacks the uncut surfaces. From the point of entry the maggot tunnels into all portions of the seed piece. Several maggots may attack the same seed piece; as many as 75 have been found in one piece. Heavy infestations of the insect cause the complete destruction of the seed piece. Less severe attacks result in the development of weak, spindling sprouts from the partially devoured seed pieces. The damage is greatest during seasons when seed germination and growth of the young plants are retarded by unfavorable weather and other conditions. In the spring of 1921, when the weather which followed the planting of early potatoes along the entire Atlantic seaboard was unfavorable, injury from attacks of this insect was unusually severe. As much as 50 per cent of the plantings in the commercial-production areas of the Carolinas was destroyed.

Potato seed-piece decays are often closely associated with seed-corn maggot infestations. Seed pieces that show only a slight degree of decay on their cut surface are very susceptible to attack by the insect. Feeding of the maggots on such seed often causes the decay to be

spread to all portions of the tuber. Decay usually takes place in badly infested seed pieces either before germination or while the plant is small.

## Experiments for Control of Seed-Corn Maggot

Studies on the control of this pest have revealed that certain farming practices greatly increase the possibilities of seed-corn maggot attack. Among these are the planting of potatoes in soils containing partly decayed remnants of a recently grown winter crop and the use of large quantities of organic fertilizer materials. However, for cultural reasons it is hardly possible for the commercial grower to select vegetation-free soil and abandon the use of organic fertilizers. No chemical treat-



FIGURE 122—A, Potato seed piece planted immediately after being cut, showing maggots at work and a weak sprout, this seed piece was hone; combed by maggots, B, subcrized seed piece cut two weeks before planting and planted at the same time and under the same conditions as the one shown in A

ment that was tested prevented the seedcorn maggot from feeding on seed potatoes.

Suberization, or corking over, is nature's way of healing the cut surfaces of the potato and will take place in the soil if the conditions are favorable. However, at the time the early spring potato crop is planted, suitable conditions for proper suberization of the seed are often the exception rather than the rule.

Suberization of cut potatoes in advance of planting has been a subject of study for

several years. In investigations aimed at control of the sced-corn maggot, the objects have been to devise practical means of suberizing cut potatoes on the farm and the testing of such seed as a means of preventing seed-corn maggot injury. The corked seed has been compared in field experimental plats with seed planted immediately after being cut. Planting of freshly cut seed is the usual commercial practice in regions where seed-corn maggot injury is most prevalent. These experiments show quite conclusively that the use of well suberized seed potatoes will practically eliminate seed-corn maggot injury regardless of the type of fertilizer used or the quantity of decaying vegetation in the soil. (Fig. 122.) In comparison with seed planted when freshly cut, well-corked seed potatoes have averaged a slight increase in yield even in plats where there was no seed-corn maggot infestation of the freshly cut plantings.

# Method of Suberizing Seed Before Planting

Effective suberization of the cut surfaces of seed potatoes can be obtained if the seed is thoroughly disinfected, cut, and stored for 10

days to 2 weeks at a temperature of 55° to 65° F. and at a humidity

of 80 to 90 per cent.

A storage cellar is usually a satisfactory place in which to store cut seed pieces, as the proper temperature and humidity for suberization are easily maintained. Before putting in the cut seed the cellar should be thoroughly cleaned and all decayed vegetable matter removed. It is further advised that the walls, floors, and all storage containers, such as baskets or barrels, be sprayed with a suitable disinfectant, such as 5 per cent copper sulphate or 2 per cent formalin or the solution used for treating the potatoes, before they are cut, to insure against development of decay organisms on the freshly cut surfaces. If a cellar is not available, any room can be partitioned off for this purpose with one of the commercial insulating boards. If a dirt floor can be provided, the problem of maintaining the proper humidity will be relatively simple, for this can be accomplished by keeping the floor moist. If it is necessary to heat the storage room to maintain the desired temperature, a small brooder stove can be used with convenience and safety.

Immediately after being cut (they should not be allowed to dry off) the seed pieces may be stored in crates, baskets, or barrels. At 24 and 48 hours after cutting, the seed pieces should be aerated by being carefully poured from one container to another. This treatment also serves to break apart the pieces that have stuck together. Suberized seed should not be kept in sacks, as the healed surfaces will be readily

rubbed off and the purpose of the storage defeated.

It has been found advantageous to move the cut seed, after the healing or storage period, to a room or a building where the humidity is about 60 per cent and the air temperature between 55° and 65° F., keeping the seed there for a day or two in order to allow the healed surfaces to dry and toughen before the seed is handled for planting.

W. J. Reid, Jr., Bureau of Entomology, W. M. Peacock and R. C. Wright, Bureau of Plant Industry.

SEED-TESTING Service Protects Farmer in Case of Many Principal Crops Because of the service that seed testing renders to agriculture, no farmer need plant seed without knowing much about its possible

crop-producing value. Most States require that agricultural seeds sold within them shall carry a statement showing the chief factors in their agricultural value. The analysis tags or labels attached to the seed at the time of sale give information on some or all of the following particulars as to each lot of seed: Kind of seed; percentage of pure seed; percentage or number of noxious and other weed seeds; percentage of other kinds of crop seed; percentage of dirt, chaff, and other worthless matter; percentage of germination (that is, percentage of the pure seeds producing seedlings capable of continued growth—those of agricultural value); and origin.

The farmer has a vital interest in the factors disclosed by the analysis of seeds. He is interested in knowing that he is getting the kind of seed he wants and that it is not adulterated with some other kind of similar-looking seed. While there is comparatively little adulteration of agricultural seeds in the United States at the present time, the statements on some dealers' tags are designed to mislead rather than to

enlighten the purchaser.

A typical case of such misleading labeling which recently came to the attention of the United States Department of Agriculture is given below:

Statement on label attached to the se	Found on analysis		ent	
RED-CLOVER SEED MIXTUR	Red-clover seed	50.	74	
	Per cent	Sweetclover seed	32.	79
Pure seed	73. 76	Other crop seed	8.	81
Crop seed.	20. 54	Timothy.		
Alsike.		Alsike clover.		
Timothy.		Alfalfa.		
Sweetclover.		White clover.		
Inert	2.40	Canada bluegrass.		
Weed seeds	3.40	Inert	4.	22
Buckhorn.		Weed seed,		44
Plantain.		Germination:		
Sour dock.		Red-clover seed	70.	50
Foxtail.		Hard seeds		
Carrot.		Sweetclover		
Germination	<b>85.</b> 00	Hard seeds		

The seed to which the label was attached had been transported by truck from one State into another and was being sold from the truck. Farmers should be particularly critical of seeds that are offered in one State carrying the analysis of a dealer in another State, unless the dealer in the other State is known to be a reliable one.

## Buyer Should Know Weed-Seed Content

The purchaser is interested in the weed-seed content, so as to know when he is being offered seed containing large proportions of seeds of the more common weeds, or when the seed contains even a small number of seeds of weeds that are not already growing on his land and that may prove troublesome and difficult to eradicate. The seeds of many troublesome weeds may remain alive in the soil for 20 to 50 years or

onger

The farmer is interested in knowing what proportion of the bulk of seed he is buying will produce seedlings that will grow into plants under favorable conditions in the soil. No seed is of agricultural value unless it is capable of doing this. He is also interested in knowing the type or variety of the seed he is buying, as this determines in large measure its adaptability to local conditions and to his particular use. The determination of type and variety is the most difficult of all determinations. In some cases it can be made from an examination of the seed itself. In many cases the seeds of different varieties are not definitely distinguishable, and then the trueness to type or variety depends on certification based on field inspection, on the reliability of the seed-selling agency, or on subsequent growing of the crop.

In the case of many of the principal crops, it is now possible to buy seed that has been certified as to type or variety by a State agency. This certification is based on field inspection followed by analysis of the seed. This State-certified seed is now obtainable through seed-handling agencies, both cooperative and private, as well as from the pro-

ducers.

# Sealed Under State Supervision

Seed that is State certified as to type or variety is sealed under State supervision in sacks of various sizes so that it goes to the ultimate consumer in the original, unopened package. Seed sold in any State

under the label required by that particular State carries the guaranty of the seller as to the statements made on the tag. Seed sold by a dealer in one State to a farmer in another State is not subject to the law governing the sale of agricultural seeds in the State into which the seed is shipped, and the purchaser is largely unprotected. The majority of cases of the sale of misbranded and worthless seeds which are reported to the United States Department of Agriculture are those in which the seed has been sold from one State to a farmer in another for his use and so is not subject to the protection afforded by State law.

The Federal seed act prohibits the interstate shipment of fraudulently misbranded seeds. In most States authority is granted under State law to withhold from sale or to seize any seed which the State finds to be misbranded, while under the interstate clause of the Federal seed act it is only possible to seize seed that is fraudulently misbranded. Obviously, then, the farmer who buys his seed in his own State has greater protection than the farmer who buys seed from outside his own State. In all cases where the purchaser has any doubt as to the correctness of the label, accurately drawn samples should be sent for analysis and test to the seed-testing laboratory of the State in which the purchaser lives, or to the Division of Seed Investigations, Bureau of Plant Industry, United States Department of Agriculture, Washington, D. C. The facts as to quality on which the various forms of protection to the seed purchaser have been built up are directly dependent on seed testing.

Seed testing protects the farmer in his purchases of agricultural seeds in so far as the farmer avails himself of the protection that is his for

the asking.

E. Brown, F. H. Hillman, and E. H. Toole, Bureau of Plant Industry.

SHEEP are Handled Advantageously Under the Bedding-Out System For many years the most progressive sheepmen of the Southwestern States have recognized that open, loose herding of sheep and 1-night bed

grounds are of special value in the production of fat, healthy sheep and are of great benefit to the range. To determine from actual practice the results of this system as compared with those of the old system of returning to an established bed ground, a study was made by the Forest Service on the Madison National Forest in south-central Montana. Definite information was desired on (1) the possibility of open, quiet herding without returning to an established camp at night; (2) the advantages of such a system to the range and to the sheep as compared with the old system; and (3) the method and organization necessary for successfully applying the new system. Several flocks of sheep were handled under each system and under such range conditions as would make the results comparable and reliable.

## The Bedding-Out System

In handling the sheep under the bedding-out system they were, whenever it was practicable, allowed to camp where night overtook them. Leaving the bed ground early in the morning, they would always have fresh feed. (Fig. 123.) They soon drifted away from the bed ground openly and quietly, the herder, if necessary, turning the

leaders. As soon as the sun was shining brightly they customarily bedded down in the shade of the pines or under browse along creek beds. In the afternoon they commenced to graze again. The herder would let them drift, turning the leaders or retarding their progress if necessary. In the evening they gradually pulled together and by dark they were all in a band, and were allowed to bed for the night.

## Herding Under the Old System

Under the old system the sheep were returned to an established camp each night. They were herded practically all day and kept in a more or less compact band by dogs. At night they were gradually herded back to the old bed ground. Dogs were used frequently in turning the leaders and keeping the tail end of the herd up with the leaders. The herder's camp was moved five times in 50 days. Camps were always near a small spring or stream and vegetation in the immediate vicinity was almost completely destroyed by the trailing to and from the bed grounds.



FIGURE 123.—The band s, reading out in the early morning on clean feed

## Comparison of the Two Systems

It was found that the sheep handled under the old system of close herding and returning to a permanent camp ground each night used 47 per cent more range than the sheep that were allowed to graze quietly and openly and bedded where night overtook them. (Fig. 124)

The "blanket" system is especially adapted to the production of early maturing lambs. Under the old system sheep are likely to be dogged and jammed, and the lambs get little rest and little sleep, and are frequently separated from their mothers. When the sheep are allowed their freedom the lambs feed and rest naturally, grow much faster, are cleaner, more easily handled, and less likely to be crippled.

The average net gain per day of the lambs under the bedding-out system was 0.43 pound compared with 0.38 pound made under the old system, making 0.05 pound per day per head in favor of the new system. Lambs grazed under both systems were trailed to Alder, Mont., and sold at 5 cents per pound. At this figure the average gain

in value per day per head under the bedding-out system was \$0.0215, as compared with \$0.019 made under the old system, or a net gain in favor of the new system of \$0.0025 per head per day. On a flock of 1,000 lambs the net gain per day would be \$2.50, or for a grazing season of 90 days the net gain would be \$225 in favor of the bedding-out system. In other words, each lamb grazed under this system made a gain of 22½ cents per head more in a period of 90 days than did the lambs grazed under the old method.

## Method of Handling Accounts for Increase

This increase in weight of the lambs grazed under the bedding-out system and the increased grazing capacity of the range can be attributed entirely to the method of handling the sheep, since (1) the ewes and lambs were all high-grade range sheep; (2) were grazed on practically the same kind of allotments; (3) were supplied with similar facilities for watering; and (4) were salted regularly and in sufficient quantities to keep their appetites normal.



FIGURE 124.—Sheep rendy to bed down near the herder's tepes

## New System Costs No More

The amount of labor is practically the same under both systems. Time consumed in driving the sheep to and from an established bed ground is offset by the time consumed in moving the tepee to where the sheep are to be bedded down at night. Ordinarily in the Madison Forest a tepee and a saddle horse for moving it are required as extra equipment under the improved system.

A timbered range is as suitable for the blanket system as are open park areas. According to one herder, it is the only method of handling sheep in timbered range. The best results, he said, are obtained by turning sheep loose because they are more nervous in timber and the

use of dogs increases this nervousness.

SHEEP Culling Largely on the Basis of Dryness Is Seldom Justifiable

Approximately 60 per cent of the income normally to be expected from a range ewe is derived from the lamb she raises; the remaining 40 per cent

represents the value of her fleece. Hence the importance, to the rangesheep industry, of a high-percentage lamb crop measured in lambs that

reach market age or maturity, can be readily recognized.

The ewes which produce the normal two crops each year—a lamb and a fleece—are the profitable ones and they must make up for the loss that is likely to be sustained on ewes in the dry band before the enterprise as a whole can show a profit. Since in a normal year about 10 per cent of the ewes in a flock may not drop lambs, the question arises as to whether dryness in young ewes may be taken as an indication of a likelihood of their poor lambing performance in later years, and whether culling should be done with considerable attention to that factor.

## Records of More Than 2,000 Ewes Studied

The practice of culling on the basis of two consecutive years' dryness has been followed by some sheep producers. A study of the lambing records of the United States Sheep Experiment Station at Dubois, Idaho, indicates that dryness in range sheep is probably much less an inherited tendency than the result of chance or a combination of outside factors. Accordingly, the culling of young ewes chiefly on the basis of their failure to produce lambs as 2-year-olds or as 3-year-olds is not justified. The records turther indicate justification for retaining in a flock even those ewes which fail to produce lambs both as 2-year-olds and as 3-year-olds provided they are superior individuals in both fleece and mutton conformation.

The records cover a period of 10 years, during which a total of 2,009 purebred Rambouillet ewes were in the lambing bands as 2-year-olds. Of this number 78.9 per cent lambed during their first lambing year, or as 2-year-olds. After the usual cullings practiced at this station, 396 of the 423 ewes which failed to lamb as 2-year-olds were retained in the lambing bands. Of these 396 ewes, 90.4 per cent produced lambs as 3-year-olds, as compared with 92.4 per cent for the 3-year-old ewes which had lambed as 2-year-olds. From this showing it can be concluded that dryness in 2-year-old range Rambouillet ewes can not be taken as an indication of dryness in succeeding years, and that culling on that basis is unsound.

Consider now those ewes which failed, both as 2-year-olds and as 3-year-olds, to produce a lamb. During the 10-year period studied there were but 37 such ewes among the 2,009 sheep. Twenty-four were retained after culling, and 20 of the 24, or 83.3 per cent, produced lambs as 4-year-olds. This is a poorer showing by approximately 10 per cent than the lambing record of all the other 4-year-old ewes which had lambed previously, during either their first or second lamb-

ing seasons, or both.

## Other Factors More Important than Dryness

The number of ewes which were dry for two succeeding years may be too small to lend any great significance to their lambing percentage record as 4-year-olds. But it is interesting to note that of a total of 1,361 4-year-old ewes only four failed to produce lambs during at least one of their first three lambing years. Furthermore, the record shows that of 768 ewes that were in the band for five consecutive lambing periods, those which failed to lamb the first year showed but slightly inferior records for the four succeeding lambing periods,

than did those which lambed in their first year.

The conclusion seems warranted that such well-recognized factors as size, trueness to type, mutton quality, and character and weight of fleece deserve more consideration when culling the ewe flock than does the factor of previous dryness. In other words, a ewe of excellent individuality offers better promise of future performance for her owner, though she has failed to lamb as a 2-year-old, than does a distinctly inferior individual which has a lamb to her credit.

JOHN A. STOEHR, Bureau of Animal Industry.

HEEP Improvement Through Breeding Is Demonstrated by U. S. Shropshire Flock Frequent inquiries received by the Department of Agriculture concerning its experiments dealing with sheep and wool pro-

duction suggest the desirability of brief printed descriptions of its flocks. The 1927 Yearbook of Agriculture discussed the foundation flock used in developing the department's flock of Southdown sheep. Similarly the present account deals with the Shropshire flock maintained at the United States Animal Husbandry Experiment Farm at Beltsville, Md., which is about 13 miles from Washington, D. C. The portion of the farm devoted to sheep studies is designated as "Sheep Acres."

The original purchase of the department s foundation flock of Shropshire sheep was made in December, 1919, when eight select yearling ewes were obtained from the flock of W. G. Miles of Evansville, Wis. These ewes were of Bibby and Minton breeding, primarily, and were

of excellent mutton conformation.

This small flock was increased in 1921 by a purchase of 12 ewes selected from a flock of 80 ewes which were being dispersed by Glimmerglen Farms, Cooperstown, N. Y. These ewes were largely of Duke of Westminster breeding, many of the ewes having been imported from that famous British flock. Other additions to the flock were made as follows: In the spring of 1924, six choice yearling ewes were purchased from Iroquois Farm, Cooperstown, N. Y. In 1927, 10 ewes of Buttar breeding were obtained, and in 1930 two Buttar and two Tanner ewes were obtained for the department by F. W. Harding of Waukesha, Wis. In all, 40 ewes have been purchased in the establishment of this flock. All were selected for their type, excellence of mutton conformation, and the desirable characteristics of their fleeces.

## Two Rams Principally Used

The first two rams used in the flock were of Duke of Westminster breeding. These were followed by two rams obtained from Iroquois Farm, three imported Buttar rams, A. J. Moore No. 201, registration No. 599091 (fig. 125), and Broughton, No. 3921, registration No. 642591. The last two rams mentioned have been used most extensively and the ewes now in the flock are practically all sired by these rams. (Fig. 126.) Young rams sired by each of these rams are now being used to a limited extent in the flock.

In the development of this flock all the best ewe lambs nave been retained for breeding stock, and about one-quarter of the entire flock is being replaced each year by the addition of yearling ewes. Of the 40 ewes purchased only 10 now remain in the flock, and only 8 of the original ewes have offspring in the flock. This number will no doubt

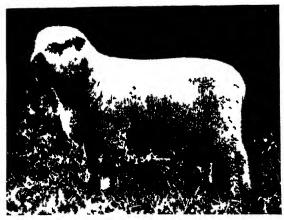


FIGURE 125 —Studram A J Moore No 201, used at the United States Animal Husbandry Experiment Farm, 1924 to 1930

be further reduced as additional information is obtained on the offspring of many of those which still remain in the flock.

# One Ewe Particularly Outstanding

Of all the ewes purchased, the one of outstanding merit was W.G. Miles No. 1031, registration No. 518-502, which is now represented in the flock by nine female offsprings and two stud rams. This ewe has

been able to produce offspring which were not only excellent themselves but which reproduced offspring also of such excellent type and conformation that they were retained in the breeding flock.

The purchase of foundation stock has now been discontinued and 25 per cent of the entire ewe flock traces directly to this ewe as well as



Fig. 1 Pr. 126 — Yearling ewes added to the flock in 1926. The photograph was taken soon after shearing to show mutton conformation. These ewes were sired by the ram shown in Figure 125

to two stud rams. It is probable that in time the blood of this ewe will occur in the ancestry of the entire flock.

The flock now consists of 36 ewes, which are reasonably uniform and of a high degree of excellence in type and mutton form. The present superior merit of this flock has been developed through years of careful

selection and corrective matings on a basis of the production of sire and dam rather than on individual excellence of each parent.

C. G. Potts, Bureau of Animal Industry.

SNAP-BEAN Seed Grown in West is Relatively Free of Blight and Anthracnose

The two most important diseases of beans, blight and anthracnose, are both seed-borne. If infected seed be planted and the weather

conditions are at all favorable, the young seedlings may develop one or both of these diseases. From such seedlings the disease may spread to other plants and cause heavy losses to the crop. Blight occurs practically every year in most sections of the United States east of the Rocky Mountains, and to some extent in the Intermountain States of Colorado, Utah, Montana, and Wyoming, and to a very limited extent in Idaho. It rarely if ever occurs in California. Anthracnose is not so general in its distribution, being restricted largely to regions east of the Mississippi River. It is seldom found in Colorado or in any of the States farther west, and when it does occur it is never so prevalent as to be of consequence. Anthracnose occurs only in regions and during seasons having considerable rainfall and where the nights are cool, which explains why it may be present in some seasons and entirely absent in others.

Growing of bean seed by seedsmen for commercial purposes is largely confined to types used for canning and for market-garden purposes, that is, the snap beans. The dry-shell bean seed is mostly saved from the previous crop by the farmer growing it, and for that reason will not

be taken into account in discussing sources of seed.

## Grown in Widely Separated Regions

Snap-bean seed is grown in two widely separated regions of the United States, that is, in the East and in the West. In the East most of it is grown in Michigan and New York; in the West it is grown in Colorado, Wyoming, Montana, Idaho, Utah, a little in California, and

to a lesser extent in some of the other States.

Eastern-grown seed is likely to be affected with blight every year, and by anthracnose if conditions are favorable for its development. A study of these two diseases over a period of years has shown that blight has occasionally occurred in an epidemic form in some of the Western States, but anthracnose never. The blight occurs much less frequently in the West than in the East and year after year is much less of a hazard.

Investigations during several years have developed the fact that western-grown seed gives a much cleaner crop than seed grown in the East, even though it is planted in regions where blight and anthrac-

nose are prevalent.

In view of the fact that these two diseases are seed-borne, and that cleaner seed is being grown in the West, the canners, market gardeners, and those requiring bean seed for planting are advised to procure if possible seed grown in the Western States. In spite of the fact that blight sometimes occurs in some of the Western States, it is less prevalent there than in the East.

Information on the condition of the crop with respect to blight and anthracnose can usually be obtained from the agricultural colleges and

experiment stations in the different States.

L. L. HARTER, Bureau of Plant Industry.

NOW Removal on Farm Roads Easily Effected With Simple Equipment All of the main roads and a great many feeder roads in the farming regions are now kept free of snow throughout the winter, according to

reports of States in the snow area. Many farmers do not live directly on such roads and must clear their own outlets if they wish to use the

highways during the snow season.

Few farms are without a truck or tractor which can be used in clearing snow from farm roads. A snowplow of low cost can be purchased or made and mounted on the machine by a simple attachment. Snow 12 or 15 inches deep can be cleared by a truck at an average speed of 12 to 15 miles an hour while a tractor can move snow while traveling at its maximum normal speed.

Plows of the straight-blade type or V-shape type can be used. The V-type plow is considered by many as more serviceable in opening the initial cut, while the straight-blade plow is believed better in widening work. The V-type plow is difficult to build because of its curved or concave surfaces, and, therefore should be purchased, but the straight-



FIGURE 127 —The improved snowplow in working position

blade plow can be built locally either from wood or metal. Either plow should be between 12 and 15 inches high.

Figure 127 shows a homemade snowplow made of scrap steel and attached to a truck by a bolt through the angle iron of the body frame on each side of the truck, the bolts arranged to act as hinges.

One end of a cable is attached to the plow blade and the other end fastened to a light set of chain blocks attached to the truck body. With this arrangment the plow blade can be suspended about 1 inch above the surface being cleared. Such plows are very serviceable when mounted on trucks or tractors, and in some instances have been used on automobiles.

## Two Methods of Snow Clearing

Variable snowfall conditions and differences in personal judgment have resulted in different procedures in snow removal. One method is to start work shortly after the storm commences and to continue moving snow until the snowfall stops and the road is cleared. Another method is to delay operation during the greatest intensity of the storm and then to commence snow removal. An advantage of the first method is that deep snow is not permitted to accumulate; but working while the storm is raging is generally hard on the operator, and if the wind is blowing there may be drifting on the cleared roadway. If the clearing is delayed until the storm is over, the removal should be started before the snow has become hard by settling, packing by traffic, or by freezing. At the beginning of the snow season the area cleared should be made sufficiently wide to provide room for the storage of snow from later storms.

The equipment described is capable of displacing newly fallen snow several inches deep and Weather Bureau records show that except in mountainous regions snow seldom falls to depths greater than 9 inches even in the heavy snowfall area of the country. Disregarding snowfall

less than 2 inches deep, the greater number of storms deposit snow between 2 and 5 inches deep, with snowfalls 5 to 7 inches deep comparatively infrequent. If snow lies as it falls, little effort is necessary in its removal. But snowfall is usually accompanied or followed by high winds which buffet the snow crystals about, and where obstacles are encountered, drifts are formed. Obstacles break the force of the wind and reduce its velocity. Pockets of comparatively still air are formed to the lee of the obstacles. These pockets permit the snowflakes to fall and create deep drifts which at times are difficult to handle. Obstacles close to the road may cause drifting on the surface while those at some distance to windward may give protec-



Figure 12s — Vinor drifting conditions caused by standing weeds

tion by collecting the loose and drifting snow. Hedges near the road, tight or partly tight fences or gates, standing weeds, and other vegetation often produce drifting. Figures 128 and 129 show slight drifting resulting from weed growth and a farm gate. The drifts shown are not troublesome, but the views plainly illustrate the theory of drift formation.

# Many Causes of Drifts May Be Removed

In preparing a farm road or lane for the winter, all causes of drifts should be eliminated where possible, or if necessary, artificial wind-

FIGURE 129 -Slight drifting caused by a gate

breaks established. A study of the location should be made and where snow usually piles up, all weeds and other vegetation should be cut and removed from the vicinity and all obstructing board fences and gates should be dismantled at least for the snow season.

Where artificial preventive measures are adopted, structures

should be so placed as to form eddies on the windward side of the road at a sufficient distance to permit the blowing snow to be deposited between the structure and the road. Such structures are called snow fences

and are built of various materials and of many designs. One type consists of woven-wire pickets, hung on light iron posts which are driven into the ground. A row of evergreen saplings is often adequate protection. The saplings are cut and the sharpened ends inserted in the ground before it freezes.

Snow fences are placed from 50 to 150 feet away from the road according to the slope of the ground. For convenience, the fences are usually placed parallel to the road. The fences can be installed in the fall after the farm work for the season is ended, and dismantled in the

spring before the start of summer activities.

Slippery surfaces often form on road surfaces which have been cleared by plows. A thin layer of snow is left on the traveled way by the snowplow, or a light snowfall occurs and the compression caused by traffic, combined with alternate freezing and thawing, results in an icy and dangerous surface. Such a condition is particularly dangerous at curves, on sidehill roadways, and on steep grades. Spreading sand, cinders, stone, or slag chips over the slippery areas is helpful in roughening the surface and preventing skidding. However, it is often found that the wind very quickly blows the material off the roadway or it slides with the wheels when brakes are applied, making replacement necessary at frequent intervals. To overcome such conditions, small quantities of coarse-grained salt can be mixed with the grit. The salt causes the angular particles to penetrate the icy formation, providing a nonskid surface with lasting qualities. Granular material for such use should be protected from moisture and freezing so that it can be readily spread when needed.

H. G. McKelvey, Bureau of Public Roads.

SOIL-EROSION Problem Under Investigation in National Control Program Erosional wastage of soil and evcessive loss of rain water from unprotected cultivated slopes and from overgrazed as well as rodent-in-

fested ranges and pastures have come to be recognized as American economic problems of grave national importance. The two processes of wastage go hand in hand, and the resulting evils are manifold. Not only is the productive topsoil being thinned by the unceasing attack of run-off water, but it is being swept away completely from countless slopes, leaving behind it subsoil which invariably is less productive and usually is more difficult and costly to till. In many instances, after the washing off of this vitally important humus layer and then of the layers beneath, the exposed material in numerous parts of the country erodes faster than the upper soil layers. Also, the exposed subsoil of many types of land is less absorptive of rain water than was the soil removed by washing, and is less retentive of the water which is absorbed, the clayey material so often exposed being more impervious when wet and more susceptible to hardening, cracking, and loss of moisture on drying.

In many localities, as the result of prolonged erosion, increased amounts of solid soil matter, dissolved constituents, suspended colloids, and water are being swept into the valleys and into stream channels, drainage and irrigation canals and ditches, reservoirs, lakes, and harbors. Lower slopes and alluvial plains are being covered on a large scale by soil started toward the sea, but stranded somewhere en route

The coarser of these sediments are injuring fields, meadows, woodlands, and protective brush and grass-covered areas. Frequently, they consist of sand and gravel having either no crop-producing value or a tremendously reduced crop-producing value as compared with the soil buried by them. Moreover, the richer deposits of erosional débris frequently are dropped over the flood plains of streams, in depressions and on lower slopes where the land is already deep and rich, needing no additional soil material

With the clogging of stream channels, formerly cultivable fields are made uncultivable or useless by reason of the increased frequency and duration of overflows Indeed, some millions of acres of formerly tilled stream-bottom land have thus been converted into marshland

and near-marshland of small value



FIGURE 130—In left background, exceedingly poor corn on stiff clay subsoil of Shelby loam, from which the productive top-oil has been entirely removed by sheet eros on Foreground shows corn buried by products of erosion in a depression that needed no additional soil material. Corn Belt, northern Missouri

## Gullying Causes Added Damage

In its effects on agricultural and pastoral lands, the maleficence of erosion over many millions of acres does not stop merely with the planing off of the upper soil layers, changing vast areas from productive mellow loams, silt loams, and sandy loams to relatively unproductive, intractable clays and clay loams (fig. 130); but goes on to the point of ruining valuable lands by gullying, even destroying them so far as cultivation is concerned. This insidious dissection proceeds with such rapidity in some of the more vulnerable regions of the country that control measures scarcely come within the scope of practical farm operation, especially where procrastination has permitted the gullies to dig deeply into the less stable substrata characterizing many types of soil. On some steeply sloping lands, gullies cut down to bedrock within four or five years after the removal of the virgin cover of timber, grass, or chaparral. Observation and surveys indicate that erosion, accelerated by the intervention of man's agricultural and livestock operations, is affecting not less than 75 per cent of all the land

in cultivation in the United States; and that impoverishing washing, with its attending diminution of the growth of nutritious grazing plants, is affecting between 75 and 90 per cent of the western ranges and a considerable part of the pastures and ranges of the more humid regions. The greater part of this is sheet erosion, which takes a part of the topsoil whenever there is rain enough to cause water to run downhill. Some 17,500,000 acres, at least, of formerly cultivated land in this country have been essentially ruined by gullying, and between 4,000,000 and 5,000,000 acres of alluvial land have practically been despoiled by overwash and increased swampiness resulting from the clogging of stream channels with eroded matter, according to surveys and observations.

The damage of erosion varies greatly, as a matter of course, because of differences in soil, slope, character and amount of rainfall, vegetative cover, and past and present usage. Soils high in content of silt, sandy loams, and loams overlying less absorptive clay layers; clays



FIGURE 131.—Recently formed gully in bean district southeast of Santa Barbara, Calif. Sheet erosion also is districtive in this region

that undergo marked granulation and fragmentation on drying; and practically all soils of low organicmatter content are especially susceptible to rapid wastage by sheet erosion. Soils with substrata of a less stable character than the overlying layers, such as those having loose, sandy, and gravelly beds and soft, silty layers, and decomposed (rotten) rock in their lower depths, suffer more

disastrously from deep-going and rapidly extending gullies than do those types having clay and silty layers of good permeability beneath their upper layers. Soils with impervious sublayers (fig. 131) are far more erosive than those with permeable substrata, that is, where the lower beds do not consist of excessively fragile materials, such as melt away in contact with flowing water somewhat in the manner of sugar. The steeper areas, of course, are usually more erosive, where the soil and soil treatment are comparable, as are, also, the less densely vegetated areas and soils kept loose at the surface by shallow cultivation and excessive trampling of stock. There are exceptions to these general characterizations, but they are not important.

## Plans for Experimentation

The wide differences in susceptibility to destructive washing, due to such variables as those referred to and, in some instances, to the manner in which erosion proceeds (erosion types), necessitate the use of various control measures in attempts to slow down or control the washing. Regions of heavy rainfall characterized by hard showers are likely to call for control measures which may or may not prove

practicable when applied to other regions where the total precipitation is lighter and the rains fall more gently. Erosion by melting snow may not necessarily call for precisely the same means of control as that

caused by torrential rainfall.

Where the primary object is to conserve water, still different methods of procedure may be required. Where wind is the chief factor or a markedly important factor in soil removal, yet other methods, such as vegetative windbreaks or fences placed at right angles to the prevailing direction of wind may be required. The effects of gravitational creep, sliding, and soil fragmentation may also call for special control measures. Widely trenching gullies with caving walls, such as characterize soils having loose or soft substrata, require different types of control dams from those required by the V-shaped gulleys which characteristically form in stiff, impermeable clays. Areas subject to rill washing, as distinguished from the more even plantation effects of sheet erosion, seemingly can not be controlled by precisely the same methods as those employed in handling the latter type of washing.

## Many Different Measures Necessary

Accordingly, the problem of erosion control and water conservation is not one in which a few simple methods of attack are likely to give widespread results of a satisfactory nature. Indeed, the process is so varied from place to place, because of natural and induced variables, that any effective control obviously will require the use of many different measures. So little attention has been devoted to the problem of land impairment by excessive washing, even though it doubtless exceeds the impairment caused by all the other agencies (of human intervention) affecting soil productivity, that we stand to-day essentially at the threshold of endeavor toward clear understanding of erosional processes and toward development of practical methods of erosion control applicable to the multitude of factors affecting the problem—such factors as soil, climate, topography, vegetation, and land usage. Until recently, quantitative data dealing with erosion and run-off, as affected by these variables, were almost completely lacking. Even now, little is known either as to the rate or type of erosion for most soils, particularly as they occur on different slopes, under different cropping systems. These fundamental data are vitally essential in connection with any sound understanding of the processes involved and with any certainty of procedure in the matter of control measures.

It was not until recently that unnatural or abnormal erosion, as distinguished from the much slower and less vicious soil washing which goes on under natural or normal conditions of ground cover and soil structure, was clearly defined. Broadly speaking, the former type of washing, that is, man-induced or man-accentuated erosion, was looked upon, until lately, as belonging to the natural order of erosional activities. As a matter of emphasis, it may not, perhaps, be amiss to repeat what has already been inferred, namely, that the national program of soil and water conservation, with which this article is concerned, relates primarily to the abnormal phase of soil erosion (fig. 132)—that which results from the activities of man and his domestic animals in breaking down natural soil conditions and stabilizers through the complete or excessive removal of vegetation and the disruption or destruction of the normal or natural soil structure by cul-

tivation, trampling, and other means. And, too, it may be well to emphasize the point that this national program is concerned chiefly with soil and water conservation, rather than with reclamation of areas already despoiled; although, of course, efforts will be made to determine the cost and feasibility of reclaiming such devastated lands.

#### Methods of Control

Fortunately, experiments aimed at determining the principles underlying soil-erosion processes will, in a considerable degree, reveal, concomitantly, methods of land use which are likely to prove most effective in slowing down excessive soil losses by washing. In other words, the methods of research employed are likely to be, necessarily, demonstrational as well as investigational in character, at least in a considerable number of instances.



Fig. EE 132—Terrific sheet eroson in Texas black land cotton field caused by one rain, on May 10, 1930. The cotton was up at the time of this rain, but most of it was washed out. The loss of soil by this one rain (from the same soil and slope as in this field) at the near-by Temple Experiment Station, as actually measured, amounted to 23 tons per acre

From what has been said in regard to the variables of erosion, the investigations manifestly must be carried out on a regional basis, that is, on the basis of the major agricultural soils or soil groups of the country and the major climatic zones. The subordinate variables, such as slope and condition of the soil as affected by different methods of use, must, of course, be given due consideration. The latter, though varying widely within narrow limits, may be classed as local variables, rather than regional, since they may affect most of the regions in more or less the same manner though not necessarily in the same degree.

The major problems as affected by these variables will be attacked first, according to the national program of soil and water conservation as at present outlined, and under as nearly average or representative conditions for the more important regions of distress as may be scientifically practicable. Naturally, the soil saving will be emphasized in those more humid regions where soil losses are of more importance to the users of land than are water losses. Conversely, the saving of water will be given most consideration in those dry regions where the amount of rainfall loss by run-off frequently determines the failure or success of an agricultural enterprise. Some modifications of this general plan of attack may be necessary in those relatively dry regions where soil shifting by wind is of greater concern to the farmer than are losses of water and soil in the run-off.

## Outline of the National Program

The national plan for soil and water conservation calls for the establishment of experiment stations in more than 20 major regions throughout the country. (Fig. 133) Figure 133, however, does not show the location of the experimental investigations being carried on in this connection by the Forest Service on the grazing and forestry lands, but only those pertaining to the farm lands. At these stations every promising, practical means of slowing down excessive run-off and wash-off, such as terracing, building inexpensive dams, crop rotations, strip cropping with and without terraces, subsoiling, strip subsoiling, surface cupping, and the use of living dams and soil-holding vines and grasses, is to be thoroughly tested on a field scale.

The program of investigations as outlined by those who have critically studied the numerous variables and objectives involved, comprises investigations in the fields of soil science, agricultural engineering, and

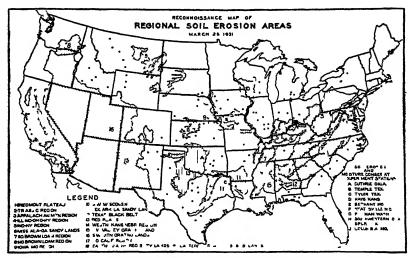


FIGURE 133 -Map showing regional soil erosion areas in the United States, March 25, 1931

forestry. It is impractical, in fact impossible, to draw sharp lines of separation between the studies in these different branches, and the program has been arranged on the basis that specialists in each field shall contribute, cooperatively, the fullest possible measure of technical and practical help. Each of the various problems will be investigated from as many angles as may be necessary to a clear understanding of the processes involved in the removal of soil by flowing water and in the control of the flow to prevent erosion and to induce absorption of the water by the soil.

Owing to space limitations, it is impossible to enumerate here the many experiments being carried on at the eight experiment stations now in operation. The starting points of various experiments are to be process studies, quantitative measurements, and preventive measures as influenced by soil, degree of slope, length of slope, cropping system, vegetation, amount and character of rainfall, seasonal conditions, tillage methods, grazing, burning, lumbering, and use of fertilizers.

## Surveys

Necessary detailed and reconnaissance surveys are to be made of small plats, large fields, farms, drainage basins, and valley areas receiving deposits of erosional débris from crop lands, grazing and timber lands, and protection areas or areas under protection for the purpose of regulating stream flow, prevention of excessive silting of reservoirs, lakes, and harbors.

### Education and Extension Activities

It is proposed to carry on programs of education and extension work in order to arouse land users, the Nation, States, counties, and business men to the seriousness of the problem of erosion, its meaning and cost; to point out the necessity for employing practical methods of control, emphasizing the fact that erosion is a business problem which must be solved now, and not one that can be put off for future generations to take care of; and to carry direct to the farmers those practical results worked out at the regional soil-erosion and moisture-conservation experiment stations which have been proved to be applicable to their local conditions. The problem of conserving more of the rainfall by causing more of it to sink into the ground where it falls and by diverting and spreading the run-off so as to apply it economically to lowerlying areas according to the water needs of such areas, will be emphasized, and any experimental results of proved practical value in this connection will be carried to the users of the lands in each region. This problem of saving more of the rainfall, of course, applies chiefly to areas characterized by low precipitation, particularly to farms and ranges within and to the west of the Great Plains.

Dissemination of the facts relating to the causal and identifiable aspects of erosion, as well as to the cost of erosion in general and specific terms of land impoverished or destroyed, and the carrying of experimental results pertaining to practical methods of control and prevention directly to the land users concerned, can probably best be accomplished through the medium of the Federal and State extension and information services, the State colleges of agriculture and experiment stations; by the encouragement of visits to the erosion and moisture conservation experiment stations on the part of farmers, business men, teachers, and students; by publication and wide distribution of departmental and State bulletins, circulars, and progress reports; by newspaper, magazine, and farm-journal articles; and by

illustrated lectures.

#### Cost of Preventive Measures to be Studied

It is proposed under the national program of soil and water conservation to determine the efficacy, practicability, and cost of all promising means of prevention, control, and reduction of erosion and excessive run-off of rainwater, and to carry the results to those users of the land according to the specific needs and adaptabilities of their soils. Obviously, it is not going to be possible to work out all the details of such a comprehensive program at once. The various research projects and required experimental installations will be taken up in an orderly manner, in accordance with their apparent importance, when and so far as circumstances permit. This is a new field of research; in order

to carry it ahead in the most efficient manner, new methods of

procedure and technical equipment must be worked out.

It will be readily recognized by all who look searchingly into the problem of erosion that it embraces so many variables, so intricately interdependent, that time, patience, and a high degree of technical efficiency will be required to solve the problem in all of its varied ramifications. That this will be accomplished wholly or in a large degree is indicated by the good progress already made at the eight established stations.

H. H Bennett, Bureau of Chemistry and Soils.

STATE Experiment Stations
Win Useful Results in
Agricultural Engineering

The investigations in agricultural engineering at the State agricultural experiment stations have been built consistently around the

problems of primary importance to the agriculture of each State, and have undergone a gradual but sound development during recent years. As progress has been made and a better understanding gained of the field and technic of these investigations, the application of engineering principles to agricultural practices has been accomplished to an extent which has considerably increased efficiency in several lines of production. High standards of scientific investigation in this field have been identical with high standards of practical service, and results which are of considerable practical utility to the agriculture of the different States have been secured.

These investigations have aligned themselves into certain general fields. These fields include farm power and machinery, farm structures, land reclamation and improvement, and rural electrification.

Perhaps the biggest returns in increased economy in production and greater efficiency per agricultural worker have been realized from the investigations in the power and machinery field. The items of power and labor in agricultural production are tremendous and have been estimated as varying in cost from 45 to 65 per cent of the total cost of production of the more important crops. The development of the important specific details of mechanical methods and equipment for seedbed preparation, planting, cultivation, and harvesting especially, has been productive of cost-saving improvements. Thus important returns in the form of more efficient and labor-saving machinery and methods for the preparation and cultivation of cotton soils have been realized from the studies of the mechanics of tillage at the Alabama Agricultural Experiment Station, for example. Similar results have been obtained with reference to the preparation and cultivation of soils for the corn crop by several of the Corn Belt stations. Equipment and methods which permit the economical and proper planting and fertilization of the corn and cotton crops in one mechanical operation also have been developed. They save time and labor and result in a better crop stand.

## Efficient Use of Traction

Much also has been accomplished in the more efficient use of animals for draft power and in the development of power draft machines and their adaptation to medium-sized farms. Practical devices have been produced wherewith the maximum draft power from animals of different numbers and weights can be secured and most efficiently used, and

these devices have been adapted economically to different draft oper-

ations on the farm.

The tractor in its earlier stages was frequently neither efficiently nor economically adaptable to the peculiar and sometimes very severe conditions of agricultural service, and it became necessary to modify and develop it in some of its more important operations, such as driving, steering, traction, and lubrication. As a result it is becoming a very useful furm machine for both belt and draft power purposes, especially in the general-purpose types. It is now possible, for example, to use tractors in field operations on some of the more difficult soils without the large losses of power through wheel slippage previously experienced. This has resulted from the development of drive-wheel design, notably by the Alabama station. The development and modification of tractor engines, especially at the California station, resulting in dust elimination and more efficient hearing lubrication, have materially reduced the cost of maintaining tractors used in farming operations. Better adaptation of the tractor to definite sizes and systems of farming has been accomplished to good advantage, notably by the Montana station. As a whole the tractor has been developed into a time and labor saving machine which, when properly supplemented by animal power, is becoming useful and profitable in many activities of both general and specialized types of farming.

## Harvesting Losses Reduced

Developments of a similar practical character have taken place in harvesting and threshing machinery. The older methods were wasteful of time, labor, power, and grain. Much was accomplished along cost-saving lines by the practical combination of the grain harvesting and threshing operations, although the losses of grain were still high. The further development of equipment and methods by such stations as those in California, Illinois, Minnesota, North Dakota, and Pennsylvania, for example, resulted in material reduction of previous large losses of grain and increased economy in power and labor. Progress also has been made in the artificial drying of the green combined grain until it has become possible in several localities to place a product of satisfactory quality in storage after combining.

Frequent large losses of hay and other forage crops through inclement weather, especially in the more humid regions, also have prompted the stations to investigate the possibility of artificially curing such crops. As a result considerable success has been attained, notably by the Louisiana station, in developing equipment and methods for artificially curing such forage crops as alfalfa, soybeans, and the like, and

at the same time maintaining their superior quality.

In the field of farm structures, numerous practical developments have resulted not only in structural soundness, fireproofness, durability, and economy of farm buildings but in their internal arrangement to produce optimum conditions for the storage of fruits, vegetables, and other crops, and for the housing of dairy and other livestock and poultry. Thus durable, economical, and sanitary dairy and livestock structures have been developed to meet the needs of agriculture in several of the States, and poultry structures have been improved along sanitary and cost-saving lines which also have favored optimum production. Much has been done toward the development of economical and effective grain storages, notably by the Kansas station, and the

way toward improved apple storages has been pointed in several of the

leading apple-producing States.

The station investigations relating to land reclamation and improvement have been equally productive of useful results. Important among the achievements in this line have been the establishment of practical and economical methods of stump burning and removal, notably by the California, Oregon, Washington, and Minnesota stations. The use of explosives for clearing land of stumps and bowlders and for the quick and economical excavation of drainage channels in swampy soils has also been developed to an eminent degree, especially by the Michigan and Alabama stations.

## More Effective Irrigation Methods

The older methods of irrigation were frequently wasteful of both labor and water, and the stations in the arid and semiarid States have expended considerable effort to introduce greater economy and effectiveness into these practices. Much more economical and effective methods of using water in irrigation agriculture are now available, and considerable equipment for its precise measurement and control has

been provided.

In the past, soil-erosion prevention measures were largely of a speculative character and frequently were expensive and not very effective or permanent. Considerable improvement has been made and much engineering precision has been introduced into methods of terracing, soilsaving dam construction, gully obstructing, and similar measures for the control of soil erosion and the conservation of storm run-off water, especially by the Texas, Oklahoma, and Missouri stations. The cost of these measures on the acre basis has been brought down to a very reasonable amount.

The somewhat recent widespread movement to introduce electricity into agricultural operations has prompted several of the stations to undertake investigations along specific lines, and already much information of practical utility has been secured. For example, electrical feed grinding, silage cutting, and other forage-processing methods have been developed along cost-saving lines, and the electrical brooding of young chickens has reached a practical stage in several States. Electrical refrigeration and milk processing have been developed along lines of utility and economy, notably by the New Hampshire station, and dairy-utensil sterilization, poultry-house lighting, and milking are other important features of farming to which electricity has been applied in a useful and profitable manner. These investigations have the well-established background of the electrical industry at their disposal and much progress has been made in lightening several agricultural burdens.

Thus the agricultural-engineering investigations at the experiment stations have established their place and demonstrated their worth in the agricultural programs of the different States. They have supplied numerous mechanical and structural means of securing higher-quality farm products with less labor and at lower costs. They have thereby assisted materially in laying the foundations of a civilization which no longer recognizes or tolerates the agricultural burdens and drudgery of preceding generations, and which considers the farm as an industrial unit as well as a home.

ROBERT W. TRULLINGER, Office of Experiment Stations.

STINKING-SMUT Control Through Seed Treatment Urged by Extension Men Estimates of field losses and market discounts indicate that during the past 10 years there has been a general increase in

stinking smut of wheat in the United States. At the present time the losses for the country as a whole are apparently on the downward trend, but from 1922 to 1926 they were decidedly upward. There are certain wheat areas, such as the spring-wheat States and the intermountain area of Utah and Idaho, where the losses still seem to be tending upward.

One of the most important reasons for the increase and continued severity of stinking smut is the appearance of new physiological or



FIGURE 134 — Aside from providing information needed as a basis for control work, the wheat-smutsurvey offers an excellent opportunity for personal contact with grower. The symptoms and losses can be shown to them and preventive measures explained

supervirulent forms of the smut fungus which have attacked more or less resistant varieties of wheat, causing heavy loss. Some of these distinct forms or races have been known in other countries for several years, and it is suspected that the great exchanges of seed wheat during and following the World War may have brought about their introduction and subsequent increase and spread. Recently, in the spring-wheat area, durum wheat, which

prior to 1925 showed practically no smut, has become very badly affected. Also the popular spring wheat Marquis, hitherto highly resistant, is now showing increasing amounts of smut. There is every indication that growers now have to deal with several forms of smut instead of with two, as was formerly supposed, and that the problem of control has been made more difficult. Adjustments in farm practices and changes of varieties become necessary. Naturally these

adjustments and changes come about slowly.

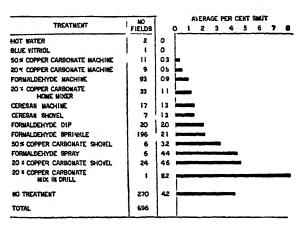
In an effort to throw further light on the reasons for the continued prevalence of smut in spring wheat, a survey (fig. 134) was conducted in 1930 covering 17 counties in 4 States. The principal objects were to find out how extensively seed treatment was being practiced; to determine more accurately the results being obtained by seed treatment; and to study the methods being followed. It was found that seed treatment was being used by only about two-thirds of the farmers in the area covered. It was further determined that satisfactory results were not being obtained by many of those who practiced seed treatment. For instance, in the 434 fields of treated seed there was considerable smut, averaging 2 per cent, while in the 270 untreated fields there was an average of 4 per cent smut.

## Faulty Methods Largely Responsible

A study of the reasons for failure to control led to the conclusion that faulty methods were largely responsible. In many cases the seed had not been thoroughly cleaned to remove smut balls. Also, the disinfectants used, either liquid or dust, had not always been thoroughly or properly applied. The result of the study of the methods bore out the conclusions reached earlier through experimentation that the most effective preventives were copper carbonate, either the 50 or 20 per cent grades, formaldehyde used according to the soaking and skimming method, and organic mercury dusts, all applied with efficient homemade or commercial machines. The same chemicals applied by sprinkling and shoveling methods were in general unsatisfactory. To control smut, it is not only necessary for more farmers to clean and treat their

seed, but for those who do treat it to perform better and more effective work.

With the increase of stinking smut in recent years there has been an extension of research and control activities by the States and by the United States Department of Agriculture. Special literature has been prepared and distributed. County agents have conducted many demonstrations showing methods of treatment



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FIGURE 135.—Relative effectiveness of different methods of treating spring-wheat seed, as shown by a survey in 1930

and the results. Several railroads have run demonstration trains emphasizing smut control. More elevator operators have become interested and have cooperated by making treating machines and chemicals available, and by adopting the practice of buying wheat on a quality and grade basis with discounts for smut. Community seed cleaning and treating outfits, either stationary or portable, have been operated in many counties, in most cases with good results. (Fig. 135.)

Some of the best examples of successful operation of portable community cleaning and treating outfits are found in California. In that State the use of copper carbonate has now become a general practice. In 1925 and 1926, 26 and 16 per cent of the cars received on the Los Angeles grain exchange graded smutty. About that time one of the counties started a portable cleaning and treating outfit. In one 20-day period it cleaned and treated for 134 growers, 35,000 bushels of grain, mostly wheat, which represented about four-fifths of the total seed grain used in the county. The average cost for the work was about 6 cents per bushel. Following this successful experience other counties began operating similar outfits and to-day many are being used in the State. A study of the report of the Los Angeles grain exchange for

smutty California wheat being received there shows that in 1929, 7 per cent, and in 1930, 1 per cent of the carloads, were classed as smutty.

### Progress in Kansas and Pennsylvania

Kansas and Penn-ylvania have each made marked progress in controlling smut during recent years. The former has just completed a 5-year program for wheat improvement which included seed treatment for smut prevention. The use of copper carbonate dust in Kansas has gradually been extended until in 1930 somewhat more than 2,000,000 acres were sown with treated seed. In 1926 the estimated loss in yield from smut was 10 per cent, while in 1930 the estimate was not over 2 per cent. Seed-treatment campaigns in Pennsylvania have



HIGTRE I.6 —Smutty wheat below, smut-free wheat above. The smutty sample shows both broken and unbroken smut balls and amut spores smeared over the outside of sound kernels. Thorough dearing to remove staut balls should precede seed treatment.

accomplished a gradual reduction in smut from 6 and 7 per cent during

1926 and 1927 to less than 1 per cent in 1930.

In the spring-wheat States the community treating outfit which is proving so satisfactory in California is not so practicable. The wet roads in the spring interfere somewhat with hauling wheat to a central treating plant, or the farm-to-farm operation of a portable outfit. However, there have been several instances of success with community treatment. At Hanley Falls, Minn., for instance, wheat had been very smutty previous to 1928. During that year an elevator manager purchased several seed-treating machines. Some of the smaller ones he rented to farmers at a small daily charge while a large-capacity machine served those who brought in their seed. The results were very striking, for in 1929 no smut was found in the first 20 carloads shipped out. Several spring-wheat counties have made progress in

control as a result of intensive work. Among these, Brown County, S. Dak., stands out prominently. In 1928 Brown County was one of the smuttiest counties in South Dakota, 41.5 per cent of the carload receipts at Minneapolis grading smutty. In the winter of 1928-29 a campaign for control was started with the result that the 1929 crop from the county graded only 17 per cent smutty and in 1930 a still further reduction occurred in spite of the general increase of smut in the entire spring-wheat area.

In the extension work for 1931 greater emphasis was placed on better and more efficient cleaning of seed to remove smut balls and on better and more efficient treating methods. (Fig. 136.) The use of sprinkling and shoveling methods was discouraged and the importance of good machines of the right type was emphasized. Where practical, the use of community cleaning and treating equipment was advised. The control of smut on a large scale is not so easy as one might suppose, and when attempted in a small way often results in failure. Therefore, in States where smut is a real problem, county agents are now being encouraged to put on intensive control campaigns making full use of demonstrations, surveys, meetings, tours, contests, news services, and other recognized extension means and agencies.

R. J HASKELL, Extension Service.

TRAWBERRY-BUD Formation
Is Favorably Influenced
By Temperature and Light

Investigations on the time of fruit-bud formation in strawberries were begun more than 30 years ago by Goff in Wis-

consin. He found that such formation began there during September. Since that time other investigators have found that this date is approximately correct for latitudes near to that of Wisconsin. Recent studies, however, have shown that there is considerable difference among the different varieties as regards time when fruit-bud differentiation is first evident and also in regard to the subsequent rate at which development takes place. The Howard 17 in the Eastern States and the Marshall in the Pacific Coast States start forming fruit buds early in September, whereas the Southland in the East and Ettersburg 121 in the Pacific Northwest do not begin until about November 1. The development of the fruit buds of the Missionary seems to proceed much more slowly than in the Dunlap, although both begin fruit-bud differentiation at about the same time.

Some information on the effect of different growing conditions upon fruit-bud development is now available; furthermore, the influence of the drought of 1930 revealed some interesting facts. In Maryland, plants severely weakened by the drought showed no signs of fruit-bud development and produced no berries. The light, late fall rains were not sufficient to start fruit-bud formation, and the crop in the spring of 1931 was very light. A few drought-resisting varieties were vigorous enough to form some fruit buds and to produce a fair crop. In North Carolina the drought also weakened the plants so that fall fruit-bud formation was much less than usual and a light "ground crop" of fruit resulted. However, owing to the mildness of the winter and early spring, fruit-bud formation took place then in all well-rooted plants, and a heavy "crown crop" of fruit resulted.

#### Two Peak Periods in South

In the Southern States, from about the Virginia-North Carolina line southward to northern Florida, there are two peak periods in the strawberry season. The first crop, known as the ground crop, is borne on fruit stalks that branch basally; the second, known as the crown crop, is borne on long fruit stalks that branch at a considerable distance from These two peak periods of production are accounted for by the fact that fruit-bud formation takes place under Coastal Plain conditions in North Carolina and southward in autumn, to some extent during the winter, and in spring. The ground crop (called crown crop in Louisiana) develops from fruit buds that form in the fall. crown crop (called limb crop in Louisiana) develops from fruit buds that form later than those that develop into the ground crop, even as late as April and May while the crop is ripening. The relative time of ripening and the amount of the ground and crown crops depend on the vigor of the plants, especially in the fall, and on the weather conditions during the fall, winter, and spring. Strawberry plants must be vigorous during the fall period in order to produce a large early ground crop. In North Carolina, in many seasons at least, if there is a large early ground crop, the crown crop seems relatively late. In an open winter many of the buds develop until they are caught by freezes and killed; in closed winters the buds are more dormant and the ground crop is

The long season of fruit production in Florida seems to be due to the formation of fruit buds going on almost continuously throughout the winter and spring but gradually coming to an end when the summer

temperatures become high.

In districts of California just south of San Francisco, fruit is produced from April to December by varieties which in other parts of the United States produce but a single crop. Conditions in these California sections seem favorable to fruit-bud formation in the same way that winter conditions in Florida favor continuous fruit-bud differentiation.

In western Oregon the Marshall variety begins to form fruit buds in the old crowns about September 1. In the same region the Ettersburg 121 variety does not begin to form buds until about November 1, but it continues to grow and develop fruit buds later than the Marshall, the top of which becomes dormant as soon as freezing weather occurs. The Oregon State Experiment Station has found that very large increases in yield result from irrigation of the Marshall, but in many years at least, no increase results from irrigation of the Ettersburg 121. The explanation of this is that much more vigorous plants are produced by summer irrigation of the Marshall, so that more fruit buds can form in September and later. Vigorous growth of the Ettersburg 121 follows the advent of the fall rains, so that extensive fruit-bud formation can take place after November 1.

# Runner Production in Spring Varieties

Spring-bearing varieties produce runners and new runner plants when the long daily light periods of summer occur, but when shorter daily light periods prevail in the fall, runner production slows up and fruit-bud formation takes place. In Florida under the short days of winter, fruit-bud formation is continuous and very few runners are produced.

In the California districts fruit buds start forming when the daylight periods of fall become short, and owing to mild weather, fruit buds there continue to form all winter. The spring and summer days in central California are relatively short, as compared with those in Northern States, and in districts near the coast are relatively cool, and fruit-bud formation continues throughout the summer.

Owing to inherent characteristics, everbearing strawberries produce fruit buds only when long daily light periods occur or have just preceded fruit-bud development. In everbearing varieties almost the entire stimulus due to long daily light periods goes into fruit-bud formation. This seems to account for the few runners put out by this type of strawberry. The everbearing strawberries do not succeed under Florida winter conditions; the days are too short there for the growth of the present everbearing varieties.

The effect of temperature upon fruit-bud development is not wholly understood. Under very warm summer conditions no fruit-bud differentiation takes place in ordinary varieties. In the California districts referred to, which are near the coast, the summer temperatures are relatively low and fruit-bud formation and fruit production continue throughout the summer, whereas in the interior valleys the

summer temperatures are high and little fruit is produced.

If temperature alone were considered, then moderate temperatures seem most favorable to fruit-bud formation. If the daily light period is considered alone, then light and dark periods of about equal length seem most favorable to some varieties, but a still shorter day light period for other sorts is desirable. In the case of everbearing strawberries, inherent characteristics cause fruit-bud differentiation under long days. Experiments and practice show, therefore, that both day length and temperature affect fruit-bud formation, each variety having a characteristic response to each condition. Lack of moisture also affects fruit-bud formation but indirectly, through weakening the plants, as illustrated above by the drought of 1930, and by the effect of irrigation on the Marshall in Oregon.

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Bureau of Plant Industry.

SUGAR-BEET Production Costs Reduced by New Cross-Cultivation Method

Lessened returns per ton of sugar beets, caused by the prevailing low price of sugar, make reduction of production costs imperative. This

can be accomplished in part by reducing the amount of hand labor required in properly thinning and hoeing the crop. A partial mechanization of some of the hand-labor operations appears to be a logical solution of the problem, especially in view of the very recent experience

in cross blocking and cross cultivating beets.

Cross cultivating beets by machinery has recently been tried on a small scale on some of the larger European estates where sugar beets form a basic part of the cropping system. To accomplish this purpose, half of the beet seed is planted in rows in one direction and the other half in the other direction. This enables the grower to cultivate his crop in the two directions of seed planting. This cross-drilling practice, however, has not given satisfactory results, owing to the fact that some of the individual beet plants are left aligned in one row and some in the cross-drilled row, thus giving such offsets as to make it

quite impossible to cultivate closely to the row because of danger of cutting out some of the beets that are not aligned. This European experience is pertinent, as it answers a question that has been of concern to many of the domestic sugar-beet growers, on the merits of cross drilling versus cross blocking. The question of space allotment per plant as required by the cross-cultivating system has also been given earnest consideration by these European growers, who find it advantageous to plant the beet seed in closer rows than the standard practice in growing sugar beets requires.

### Experience in the Humid Area

In the United States, before 1929, cross blocking and cross cultivating of beets were not attempted except in an experimental manner, and then only on a very small scale. These early experiments plainly demonstrated the workability of the practice on fields of good beet stand, although the need for such radical departure from established methods was at that time seriously questioned. As shortage of labor became acute, the industry became willing to make the concessions apparently demanded by this practice. The cross blocking differed from the mechanical blocking which has been successfully used since 1927 in fields of good beet stands as an aid to reduce competitive effects of the unthinned beet plants. In mechanical blocking the space allotment per plant is much less than in cross blocking, since no cross cultivating is attempted.

Cross cultivating of beets was undertaken on a large scale in 1930 in the Iowa, Minnesota, and North Dakota sugar-beet growing areas, by about 500 growers on approximately 10,000 acres of beets. The fields to be cross cultivated were cross blocked with the same cultivator used for later cultivation. In most cases, only fields of excellent beet stands were selected for this purpose. The cultivator, generally a 2-bar tool type, was equipped with disks for cutting the block, and shields were attached to the disks to protect the beets retained in the block from being covered by soil. Duck-feet or V-shaped knives on curved shanks were mounted on the tool bar in such a manner as to eliminate completely weeds and beets growing in the beet row between the blocks of beets which were retained. The additional cultivating tools or attachments required do not add greatly to the cost of the equipment, since they are inexpensive and usually part of the standard equipment. (Fig. 137.)

As a result of this cross blocking, thinning operations were expedited in such a manner that quite generally a twofold output of acreage thinned per day per adult worker was secured, and frequently even higher rates of thinning were reported. This higher rate of thinning is made possible because the cultivation given in two directions eliminates hand blocking and leaves the surface of the soil in such a loosened condition that the laborer can do the thinning without using a hoe. This greater efficiency of hand labor, and the handling of a considerable part of the job of blocking and thinning with local labor, is of great significance as a means of reducing cost of production of sugar beets.

# Weeds More Effectively Controlled

After being thinned, the cross-blocked beets were cross cultivated in the same way that a cornfield is handled. As a result of this cross cultivation weeds were controlled more effectively than in fields where cultivation in only one direction was given. On the acreage thus cross cultivated, the subsequent hoeing cost was about \$2.50 per acre, as com-

pared with the contract hoeing price of \$6 where no cross cultivation was em-

ployed.

Since, in the crosscultivating operations, a different spacing of beets in the row and different distances between the rows are necessary, both being departures from the established practice, a spacing test was conducted at South East Experiment Station at Waseca, Minn., in 1930, to determine the proper space allotment per individual beet plant. This test, which was adequately replicated, indicated that the beet plots in which beets were spaced 18 by 18 inches apart produced very satisfactory yields in comparison with the standard 22 by 12 inch spacing of beets for the southeastern Minnesota area.

The question of how far apart the rows should be planted and the distance of spacing beets in the row must necessarily be answered by the available soil moisture supply, whether or not irrigation of the crop is practiced, the soil





FIGURE 137—Cross blocking and cross cultivation of sugar beets 1—Note the arrangement of tools, consisting of disks, shields, and duck feet, and the marker attachment. B—The same field thinned. Note the square patterns brinches by brinches, the full stand, the clean condition of the field, and the sturdy growth of the beet plants. C—The same field at harvest. Note the uniformity of foliage growth and the excellent condition of the field in spin of a protracted period of drought.

type and slope, the fertility of the soil, and the equipment available for this work. Where a tractor is available for cross blocking and cross cultivating the rows can be considerably narrower—16 by 16 inches and possibly less—than where heavy draft animals are used for this work.

Cross cultivation of beets seems a logical step in the mechanization of the sugar-beet industry. With proper control, it should develop into a widespread practice. Success with this method, however, requires greater attention to fundamentally sound agricultural practices such as proper fertilization, a good cropping system, fall plowing, early and thorough seed-bed preparation, and a first-class stand of beets. To secure a good stand suitable for cross cultivating, a generous seeding rate, timely seeding in narrower rows, and early cultivation are necessary. The small blocks (2 to 3 inches wide) which are left should be promptly thinned under close supervision, so that all weeds are removed and the strong, sturdy beet plant is retained. To obtain the maximum benefits from weed control, and to produce an effective soil mulch, cultivation of the crop in both directions should be continued as long as necessary. Where due attention is given to these items, a material saving in both ton and acre costs of production of sugar beets should result.

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SUGAR-BEET Production Is Entering New Era As Disease Control Gains In common with other agricultural crops, the sugar beet is subject to serious losses because of plant diseases. These losses vary somewhat from

year to year, but they are annually, in one area or another, a serious handicap to successful and stable crop production. Specific control of sugar-beet diseases has usually not been attempted. Certain general measures, which may collectively be termed good farming practices, have served in the past to minimize losses. With the pressing economic requirement for efficient crop production, more attention is being given to disease-control methods as means of increasing production per unit area by preventing losses and wastes caused by diseases. A few illustrative examples are cited from work of the scientific staff of

the Division of Sugar Plant Investigations now in progress.

The blackroot disease of the seedling beet is the most frequent cause of bare, idle spots in the sugar-beet field, and is chiefly responsible for the poor stands obtained in certain eastern areas. Because of attack by parasitic fungi, the young plant may never get above the ground, or if it emerges may "damp off." The fungi that cause this disease are in part seed-borne and in part present in the soil. In combating the blackroot disease, crop rotation, the use of well-drained fields, good seed-bed preparation, seasonably early planting, and prompt cultivation have been found helpful. It is a common observation that the beet plants in the field before thinning show marked differences among themselves; some are stunted and apparently unable to grow, others are sturdy, vigorous plants whose leaves and roots are already rapidly expanding. The healthy plant stands out strongly from its diseased neighbors. The selection of such sturdy plants at thinning time has been shown to give marked improvement in stand, and the effect of this selection has been reflected in the yields. Care at thinning time to insure starting with healthy plants also does much to avoid the rotting of half-grown or mature beets in the field, since much of this rotting seems to trace back to disease contracted in the seedling stage.

#### Disinfection of Seed Balls

A new method to supplement these desirable practices seeks to protect the young plant from the invading fungi by coating the seed with a fungicidal dust which disinfects the seed ball and a small zone of soil around the young plant. One of the most successful dust coatings yet found contains a mercury compound as the fungicide and in addition has a small amount of readily available plant food which promotes rapid growth of the young seedling. In the experimental trials, seedtreatment methods have been highly successful in preventing the blackroot disease. Field experiments to adapt seed treatment for commercial use are under way. The field problem is complicated by the massiveness of the infection that sometimes occurs with heavy, poorly drained soils, the different species of fungi involved, and the great variety of conditions encountered in the field tests. The results so far indicate that a simple and fairly inexpensive seed treatment gives excellent stands under conditions where untreated seed gives unprofitable ones.

The sugar-beet nematode has caused serious injury to beets in western beet-growing areas, and the infested acreage is becoming larger each year, because of failure to maintain a safe rotation and owing to the introduction of infested soil into clean fields. Tests over a number of years have shown that for almost all western areas a long-time rotation system, using crops, such as alfalfa, not subject to injury by this nematode, is adequate to control the nematode. In the California area this method apparently has not been successful. It has been shown that the presence of various susceptible weeds served to prevent the nematode from being starved out. Improvement of the alfalfa stands by better methods of culture, by application of commercial fertilizer, primarily phosphate, where necessary, and by plowing up the alfalfa as soon as weediness begins to develop, has made nematode

control by crop rotation successful in California.

The leaf-spot disease caused very great damage in 1930. In experiments in Colorado, where the disease was at its worst, the leaf spot was controlled by dusting the fields with a fungicidal dust, composed of 20 per cent copper sulphate (dehydrated) and 80 per cent lime (hydrated), applied four or five times at 10-day intervals, beginning about July 1. The total cost of the treatment, about \$5 an acre, was greatly exceeded by the gains obtained through leaf-spot control. In many large-scale tests increases of 1½ to 2 tons per acre in yield and from 750 to 1,000 pounds of sugar (estimated, net) resulted from the dusting. Commercial use of the method on about 500 acres was similarly successful.

#### Disease-Resistant Strains

Leaf-spot-resistant and curly-top-resistant strains of sugar beets have now been produced as a result of years of intensive pathological and breeding work by the Department of Agriculture. By selecting individuals that were outstanding under conditions of severe disease outbreak, and by repeated elimination tests, strains of beets that are highly resistant, of high quality, and of high yielding capacity have now been obtained. In the 1930 tests the leaf-spot-resistant selections produced approximately 2 tons more beets per acre, containing 1½ to 2 per cent more sugar, than the commercial checks. The curly-top-resistant strains under moderately severe curly-top conditions out-yielded the commercial checks 3 to 1, and except for the most severe

curly-top conditions apparently give satisfactory yields. Breeding work to improve these resistant strains further is being continued, and as rapid an increase of the present seed stocks as practicable is being made to permit introduction of these improved strains into commercial use.

Disease-resistant strains represent the ultimate solution of the serious disease problems in sugar-beet growing. Since all the sugar-beet seed used is under the direct control of the contracting companies, the resistant strains, as soon as they become available in adequate quantity, can readily be substituted for the nonresistant strains. Such a control measure, which entails little if any extra cost, will largely free the farmer from the disease hazard which now is so serious in many areas, and will also bring about the return of sugar-beet production in many areas where beet culture has been abandoned because of diseases.

Sugar-beet growing can be said to be entering a new era in which safe and effective methods for increased crop production and for the prevention of disease losses will be employed to a far greater extent than has been done previously. The sugar beet responds readily to proper cultural practices, and the improved methods of crop handling will bring about efficiency and economy in production. In addition, specific control measures, such as seed treatment, dusting to prevent leaf diseases, the scientific use of rotation as a sanitation measure, and other methods which are under development, will greatly reduce the present crop losses. In this phase the disease-resistant strains are especially important. The finding that strains of sugar beets which are resistant to disease can be developed by methods of selection and breeding is significant not alone because of the relationship to the particular diseases that have been under study but because of the wide adaptability of the finding to other and similar sugar-beet problems.

G. H. Coons, Bureau of Plant Industry.

SWINE Take Lungworms into Their Bodies by Consuming Earthworms

Lungworms, of which three different kinds are known to occur in swine, are among the most injurious parasites which infest these animals. The

young forms of various other parasites of swine remain in the lungs for varying periods and then pass out of these organs, but lungworms localize in the lungs and remain there throughout their life. The degree of injury inflicted by lungworms depends to a large extent upon the number of worms which lodge in the lungs as well as upon the degree of resistance the animals offer to the invasion of the parasites. Young pigs have comparatively little resistance to parasites in general, and a heavy lungworm invasion of such vital organs as the lungs is likely to produce serious consequences.

The most outstanding symptom of lungworm infestation is a husky cough, a condition which weakens an animal, particularly a young animal, and lowers its vitality. Though lungworms occur in the windpipe and in its two main branches, the bronchi, they usually accumulate in the finer branches of the bronchi, known as the bronchioles. They are commonly present in sufficient numbers to plug completely the finer bronchioles in which they lodge, thereby interfering with normal breathing. The accumulation of the worms in these locations is commonly accompanied by worse or less localized accumulation is commonly accompanied by worse or less localized accumulation of the worms in these locations is com-

monly accompanied by more or less localized pneumonia.

# A Knowledge of Life History Important

In order to combat a parasite it is important to know the essential facts of its life history, particularly the way in which it gains entrance to its host. Without this knowledge comparatively little can be accomplished in the way of rutional control and prevention. Until very recently nothing was known regarding the manner in which lungworms entered the bodies of swine and of their subsequent development in the hosts. In view of this no recommendations of control and preventive

measures could be made with any assurance of success.

Investigations carried out in the Zoological Division of the Bureau of Animal Industry a number of years ago demonstrated conclusively that the larvæ of swine lungworms, which hatch from eggs that are discharged by these parasites, are not capable of intecting swine. The results of these investigations pointed to the likelihood of an intermediate host in which the parasites would have to undergo part of their development before being capable of establishing themselves in swine. However, the kind of intermediate host involved in the life history of swine lungworms was not determined in the course of these investigations.

# Earthworms Found to Transmit Lungworms

In 1929 two German scientists discovered that common earthworms. or angleworms, were the intermediate hosts of swine lungworms, and demonstrated that swine could be experimentally infected by feeding them infested earthworms. These investigations were promptly confirmed by the writer and J. E. Alicata, junior zoologist, of this bureau, who traced the complete life history of the parasites from the time they entered the bodies of earthworms until they attained their full develop-

ment in swine. Briefly, the life history is as follows:

Swine infested with lungworms eliminate the eggs of these parasites with the manure. Earthworms which are present in hog lots and pastures take the manure into their bodies and with it the larval lungworms which hatch from the eggs. Once inside the body of earthworms, the lungworm larvæ enter the wall of the esophagus, and in this and other locations to which they wander the larvæ grow and develop to a stage which is infective to swine. In warm weather the period required for the development of lungworm larvæin earthworms is about 10 days but in cooler weather this period is prolonged considerably. It has been determined that lungworm larvæ may remain alive in earthworms for several months. If infested earthworms are eaten by pigs, the lungworm larvæ are set free in the intestine as a result of digestion. The larvæ then penetrate the wall of the pig's intestine and on reaching the lymph spaces they are carried along with the lymph stream and thus get into the blood. They finally localize in the lungs and attain fertile maturity in about four weeks.

# Earthworms Abundant in Old Hog Lots and Permanent Pastures

Investigations carried out on farms in Maryland, North Carolina, and Georgia have shown that earthworms are particularly abundant in old hog lots and on permanent pastures. The accumulation of manure and litter in permanent hog lots is especially favorable to the perpetuation of earthworms which thrive and multiply in such places, presumably because of the abundant food supply which they obtain from the manure. Well-drained, cultivated fields, on the other hand, have been found to contain relatively few earthworms. In some fields which had been cultivated seasonally, very few earthworms were found after a rather prolonged search.

In the light of these findings, it is evident that lungworm infestation in swine is likely to be present and troublesome when these animals are raised in hog lots and on permanent pastures. This was actually found to be the case in investigations conducted in the States mentioned. A large percentage of earthworms, obtained from old hog lots and from permanent pastures on which hogs had been raised year in and year out, were found to be infested with lungworm larvæ. In some cases 1,000 or more larvæ were found in a single earthworm.

In view of the rooting habits of swine, it is easy to see how they would become heavily infested with lungworms should they happen to swallow, as they are likely to do, only two or three heavily infested earthworms. As already stated, earthworms were obtained in only very small numbers from hog lots and pastures which had been cultivated seasonally, and in these cases the degree of infestation of the earthworms with lungworm larvæ was usually slight, or infestation was altogether absent. Low areas outside the fences of these cultivated fields usually harbored a fair supply of earthworms more or less heavily infested.

# Keep Pigs Confined in Clean Fields

It is evident from these findings that control of lungworm infestation in pigs necessitates raising the animals on new pastures or cultivated fields, and preferably on fields which are well drained. In this connection it is important to have good fences in order to keep the animals from getting outside the fields. Pigs should not be raised on old hog lots and permanent pastures, as these places harbor not only earthworms, the source of lungworm infestation, but also eggs and larvæ of various other swine parasites and the germs of infectious diseases.

BENJAMIN SCHWARTZ, Bureau of Animal Industry.

ENDERNESS Tester for Canned Goods Aids in Food Law Enforcement

The McNary-Mapes amendment to the food and drugs act, signed July 8, 1930, charges the Department of Agriculture with the responsibility

for fixing standards of quality and condition for certain canned foods. The amendment requires a special form of low-quality branding on all products falling below the announced standards. Faced with the necessity of measuring the various quality factors in some accurate and objective manner, the department's scientists were forced to invent an apparatus for measuring tenderness, a major factor in the quality of many canned foods.

After exhaustive experiments, a device 3 was perfected that is sufficiently versatile to measure with precision the tenderness of such

This apparatus is described and illustrated in Department Circular No. 164, An Apparatus for Determining the Tenderness in Certain Canned Fruits and Vigetables

widely different cannel foods as peas, peaches, apricots, and pears. In every case, department findings have tallied with the consensus of expert graders as to the point at which lack of tenderness becomes definitely objectionable.

The advantages of an impersonal method of tenderness measurement, independent of personal judgment, capable of and giving accurate results in the hands of any intelligent operator, are obvious. The canner can assure himself, by his own tests, that his product conforms to the tenderness requirement. On standardized products, like peas for ex-

ample, where tenderness is a paramount quality factor, the consumer is warned against hard and tough canned food by the low-quality legend required by law. Last, and most important of all, the farmer now seems to have some hope of getting, in the future, a satisfactory reward for producing fruits and vegetables of the proper stage of maturity for canning. There seems to be no reason why the apparatus should not prove equally satisfactory for measuring the tenderness of many raw food products of various sorts. and of other canned foods not yet under standardization. The device is illustrated in Figure 138.



FIGURE 139 —V. B. Bonney using apparatus designed by him and other chemists to test the tenderness of canned peas

As used on fruits, the device is very simple, consisting essentially of a vertical metal plunger sliding freely in a close-fitting sleeve. On its lower end is a cylindrical rod of specified diameter, which is made to penetrate the fruit by means of a load of mercury applied at the upper end of the plunger. Penetration is abrupt and complete, and the weight of plunger, flask, and mercury at the moment of penetration constitutes a precise measure of the tenderness of the fruit under test.

# Resistance to Crushing Measured

With a canned food, such as peas, the device becomes more complicated. Crushing is a better measure of tenderness here than penetration, and the rod is accordingly replaced by a horizontal metal disk.

The end-point is not definite as in the penetration test for fruits, and thus it is necessary to crush the pea to some predetermined fraction of its original thickness. This necessitates a micrometric method of measuring the diameter. This is effectively accomplished by a long lever so pivoted as greatly to magnify the measurements, which are then read off on a graduated scale. Scale and lever are so insulated that a buzzer will sound when the disk is depressed to any predetermined distance from the "zero point," which is, of course, the point where the disk is in contact with the surface which supports the material under test. The adjustment is such that, in this position, the lever reads zero on a graduated scale. If, now, a pea is found to measure 28 on the arbitrary scale, one can set the lever at 7 and be assured that the buzzer will sound when the pea has been crushed to exactly one-fourth its original diameter by the load of mercury. Mercury, flask, and plunger are then weighed as in testing fruit.

W. B. White, Food and Diug Administration.

IME-LAPSE Motion-Picture Camera Helps Department's Research For several years the Department of Agriculture has possessed a so-called time-lapse motion-picture camera, designed for making accelerated-action

cinematographs. This equipment, consisting of an ordinary motionpicture camera, with clock movement, motor, and associated automatic switches, enables the cinematographer to make exposures at intervals ranging from a fraction of a second to one hour, thus making film that, with normal projection, presents action accelerated in proportion to the length of time between exposures.<sup>5</sup>

Time-lapse shots have been made with this device from time to time for use in departmental motion pictures, but it was not until 1928 that the experimenters began to realize the possibilities of time-lapse cinematography in research. At that time, while they were running time-lapse shots of germination tests for the seed-testing laboratory of the

lapse shots of germination tests for the seed-testing laboratory of the Bureau of Plant Industry, something developed that gave them a new conception of the time-lapse camera as an instrument for research.

The work had been planned to show the progress of a germination test as a minor feature of a general film on seed testing, but the behavior of certain seedlings, that germinated but failed to grow, proved so unexpected and interesting that an entirely new set of tests was started solely for the purpose of observing the peculiarities of these abnormal seedlings. The time-lapse camera was run for many weeks on these tests and the result was so enlightening to those who conducted the experiment that they took the film to Rome on the occasion of the fifth congress of the International Seed Testing Association and showed it before that body. Edgar Brown, in charge of the seed-testing laboratory, relates that it was necessary to run the film many times in succession in order that the audience might have an opportunity to observe carefully the action of the abnormal seedlings in question.

<sup>&</sup>lt;sup>4</sup>This article summarizes the material presented in an article by the same writer in the Journal of the Society of Motion Picture Engineers, Vol. XVI, No. 5.

<sup>5</sup>This mechanism, originally designed by George R. Goergens about 10 years ago, was built and perfected by the late Howard Greene.

### Used in Studying Bacteria

During the winter of 1929-30 the research laboratories of the Bureau of Dairy Industry used the time-lapse camera in studying the growth of bacterial cultures. For this purpose a Pyrex glass tube 7 millimeters in diameter and 30 meters long, coiled in a flat spiral and filled with an infusion broth, was used as a track along which the progression of the bacterial growth was to be photographed. The culture was started at the center of the coil, and as it worked outward through the coil its progress was marked by a decided change in color of the liquid in the tube. The coil was so mounted as to fill the field of the camera. The room in which the work was done was held at an even temperature by automatic controls and exposures were made at 5-minute intervals. A watch, placed in one corner of the field, provided a check on the timing mechanism of the camera. About eight days were required for the culture to traverse the 30-meter length of the coil, and during that

time about 140 feet of film was exposed.

This film was then projected with a film-strip projector to the full size of the coil itself, and working on this projected picture. one frame at a time, a series of measurements was made and tabulated. These measurements, disclosing the progress of the culture in millimeters per hour, were plotted against the total hours of growth, and the resultant graph indicated beyond question the fact that the growth of the bacteria was intermittent and that the recurring periods of growth and rest were fairly rhythmical. These facts were of profound interest to the investigators who conducted the experiment. The paper on the subject, by L. A. Rogers and G. R. Greenbank, published in the Journal of Bacteriology, aroused keen interest among bacteriologists in general, since the time-lapse cinematographs in question served to establish facts that had been suggested by the growth of cultures on agar plates, but which could not positively be proved by that method. As to the ultimate scientific significance of this fact, one can only conjecture; it may or may not have a bearing on intermittent fevers. In any event it provides further evidence of the value of time-lapse cinematography in research.

#### Not Used as a Motion Picture

It should be noted that neither in the case of the germination test, nor in that of the culture test was the resultant film used as a motion picture in the sense in which we are accustomed to think of motion pictures. In the first instance the film was projected over and over, to enable the observers to make careful note of minute movements of the roots and stems of the seedlings; in the second instance the film was not used on a motion picture projector at all but on a slide projector.

In this connection, then, the time-lapse camera should be considered as an instrument in the same category as the microscope; it makes visible to the eye action that is normally invisible, as the microscope makes visible to the eye objects that are normally invisible. The microscope exaggerates space; the time-lapse camera epitomizes time with reference to movement, and shows motions and rhythms which are hidden by the normal lapse of the hours.

RAYMOND EVANS, Extension Service.

TOBACCO Culture Needs Improvement in Methods of Growing and Curing A number of distinctive types of tobacco are produced, each of which is grown in certain areas possessing the proper conditions of climate

and soil. Generally speaking, it is a waste of time and money to try to change the type produced in a given locality. It is useless, for example, to attempt to grow cigarette tobacco in cigar-filler tobacco territory, or to grow bright flue-cured leaf in regions adapted to the production of dark, heavy air-cured or fire-cured tobaccos. As a rule only local varieties of seed should be used. Moreover, far too many local varieties and strains are in use. Promising results have been obtained in developing standard local strains possessing ample yielding capacity and desirable habits of growth, including necessary resistance to diseases, and at the same time capable of producing a quality of product generally acceptable to the manufacturer. General use of standard strains would go far toward insuring for each distinctive type a product of greater uniformity and higher quality.

#### Soil Management and the Cropping System

To obtain high-quality tobacco of a given type it is not only necessary to choose the right type of soil but it is also important to maintain the right conditions in the soil. Recent investigation has emphasized the special need of giving close attention to two of these conditions, namely, soil reaction and soil aeration. In general the tobacco plant grows best in a moderately acid soil, one having a pH value ranging from about 5 to 6. If the soil is too acid, among other things manganese or other heavy metals are likely to become sufficiently soluble to produce toxic effects on the plant. In a neutral or alkaline soil there is danger of serious damage from the black root rot disease. On some of the light sandy and sandy loam soils tobacco has been grown continuously for more than a half century without decline in yield or quality. Suitable systems of crop rotation may be needed to maintain other soil types in proper condition. However, on some soils tobacco is very sensitive to the effects of preceding crops in the rotation. On such soils tobacco may be a failure when grown after a timothy sod or after such crops as clover or corn. In this case continuous tobacco culture may give best results. The wild vegetation resulting from allowing the land to remain idle for two or three years often greatly improves the yield and especially the quality of the tobacco crop. It has been found that the tobacco plant also is very sensitive to inadequate aeration of the soil. In this connection thorough and frequent stirring of the soil is helpful, and oftentimes moderately high ridging of the rows, particularly in the later stages of cultivation, gives excellent results.

# Fertilizer Usage

An abundance of plant food with a high proportion of nitrogen in the ration is needed for best results with cigar tobaccos. Cigarette tobaccos, especially the flue-cured type, should be grown with a comparatively low supply of nitrogen. For the cigar types grown without manure the proportions of nitrogen and potash should be about the same and equal to or somewhat greater than the proportion of phosphoric acid. When manure is used larger proportions of phosphoric acid and

potash are desirable. For cigarette types the nitrogen supply usually should be not more than one-half that of the phosphoric acid, while the potash supply should equal or exceed that of phosphoric acid. For the cigarette types, therefore, larger quantities of potash than have been formerly used are indicated. It appears that somewhat larger proportions of inorganic or organic water-soluble forms of nitrogen than have been supposed to be safe can advantageously be used in place of cotton-seed meal and other similar organics in the case of cigarette tobaccos, where the fertilizer is applied in the row. Present indications are that these increases in water-soluble materials in the fertilizer, together with a tendency toward heavier rates of fertilizing, will make it necessary to resort to fractional or split applications on light soils. This problem is now under study.

#### Control of Diseases

In most instances prevention rather than cure is the key to effective control of diseases. Some of the most important diseases usually originate in the seed bed, and production of disease-free seedlings should be one of the principal aims of the grower. Effective seed-bed sanitation should include use of disease-free seed; employment of soil, frame, and covers for the seed bed known to be free from contamination or made so by steaming or other satisfactory method of sterilizing; application of all necessary measures to prevent infectious tobacco material from reaching the beds; avoiding careless use of tobacco in smoking or chewing when working about the beds. These precautionary measures apply particularly to wild fire and similar leaf-spot diseases and to mosaic. For black root rot and black shank the use of highly resistant varieties offers the best method of control. For root knot and Granville wilt, crop rotation is the only method of control now available. Rotation also is an important step in preventing the development of mosaic in the field.

# Curing

Air curing, pure and simple, gives satisfactory results only when the weather conditions are reasonably favorable. In periods of excessively wet weather, losses from pole sweat or house burn are to be expected unless some form of artificial heat is used to reduce the humidity. There is great need of a cheap, effective method of introducing into the barn, air that has been previously conditioned. In the meantime more general use should be made of charcoal fires on the floor of the barn as a means of preventing pole sweat. In flue curing an important forward step has been made in the introduction of fireproof barns constructed of clay or concrete tile. The dwindling supply of wood for fuel is creating a need for more economical methods of obtaining the necessary heat for flue curing. Similarly, for fire curing it is becoming increasingly difficult to obtain an adequate supply of suitable hardwoods for fuel, and research is needed in the use of wood distillates or other substitutes for imparting the necessary flavor in the smoke curing. Scarcity of fuel often leads to insufficient firing or smoking during the curing.

W. W. GARNER, Bureau of Plant Industry.

TOBACCO Grading and Market News Promote Fairer Auction System The auction system of marketing tobacco through which approximately 82 per cent of American tobacco is sold is the only large-scale system

of marketing through which lots of identical quality sell at widely different prices, on the same market, on the same day, under the same conditions, and to the same set of buyers. A lot of tobacco may be auctioned at a certain price and almost immediately thereafter be resold for doul le or half the amount first offered. The wide spread in prices paid for lots of the same grade of tobacco on auction floors is due to several factors. One of the principal factors is the system of buying on the basis of average prices for private grades. Each buyer will purchase tobacco according to several private grades. The buyer is not concerned with the price of individual lots but buys to make any grade average a certain price for the day's purchase. If a buyer has an average of \$20 per 100 pounds on a particular grade and secures certain lots of that quality at \$10, he can buy in other lots of the same quality at \$30 and keep his average within stipulated limits. This undesirable feature of the auction system makes it impossible for farmers to determine the market value of any tobacco they may have for sale. In addition, each buyer indicates the quality of his purchases by private grade marks and this further confuses farmers since they are unable to interpret correctly the grade symbols of all buyers.

It is evident, therefore, that farmers require information on two separate, but closely related, phases of tobacco marketing. They should know the grade of each lot and the average market price being paid for each grade. The first has been provided by the United States standard grades for tobacco and their application through the Federal-State tobacco-grading service. The second can be supplied only by furnishing farmers prices at which standard grades are actually sold.

This is done through the market-news service on tobacco.

Three distinct classes of tobacco are marketed by the auction system. These are known as flue cured, fire cured, and air cured, and in appearance and use are as distinct as three kinds of fruits or vegetables. These classes are subdivided into types. Each tobacco market is usually organized for the sale of a particular type, and for this reason, market-news information from markets of one type is of no great value to farmers who produce tobacco of another type.

# Necessary Bases of the Service

Market-news service on tobacco, to be of benefit to farmers and the trade in general, must be based upon sales of individual types of tobacco and average prices for the grades of a particular type must be determined by actually grading a large volume and calculating the average price for each grade. The tobacco market-news service of the department is based upon all information that can be obtained and compiled for a type area. Only one tobacco market-news office is established for a type, since the variation in price per grade on any market is almost as great as that between markets and also because the expense of operating a tobacco market-news service would be needlessly increased by reporting each market separately. In some cases it has been possible to secure sufficient price information from one important market of the type, whereas for other types it has been practicable to

secure information from several markets and correlate it at one news

office that issues reports for the type.

Three kinds of reports are issued: Press reports, daily mineographed reports, and weekly mimeographed reports. Press reports are released by telegraph to the press on the afternoon of each marketing day. These reports give average prices paid. on the day of dispatch, for certain "key" grades; information as to the volume of sales for the market, or markets; and range in quality of the tobacco offered for sale. Daily tobacco market-news reports are mimeographed, at the local market-news office, on each marketing day. These are distributed to farmers on auction floors and by mail. They are also sent to the agricultural press, agricultural teachers, county agents, warehousemen, tobacco companies, and other persons interested in the tobacco industry, who request that their names be placed on the mailing list. In daily reports, average prices, by grades, are given for the day as compared with averages for the previous day, for the previous week, and for the season to the end of the previous week. Information relating to individual markets and general price comments are also included in daily reports. State officials have cooperated by broadcasting over the radio information contained in either daily or press re-Weekly reports are issued on Saturday from tobacco marketnews offices for each type. The weekly reports give average prices per grade for the week, for the season to date and for the previous season. These reports also review the market conditions for the week and give information on crop conditions, on stocks on hand by types, and on domestic and foreign conditions affecting the tobacco industry.

Farmers can, by consulting the reports of the tobacco market-news service, keep thoroughly posted on current tobacco prices, by grades. Immediately following an auction sale, farmers have the privilege of rejecting the prices offered for any lots of tobacco, but heretofore they have had no definite information which could be used as a guide in accepting or rejecting bids offered. The application of standard grades and the market-news service on tobacco provide the means for a more uniform and equitable system for marketing tobacco on auction

floors.

Frank B. Wilkinson, Bureau of Agricultural Economics.

TOMATO Variety Called Break o' Day Succeeds in Far Scattered Tests A new variety of early tomato called Break o' Day is the outstanding result of a cross of Marglobe on Marvana made in the greenhouses of the

United States Department of Agriculture at Washington, D. C., in 1923 by the late Fred J. Pritchard, formerly senior physiologist in the Division of Horticultural Crops and Diseases of the Bureau of Plant Industry. The new tomato is rapidly gaining favor as a marketing and shipping variety because of its earliness and the large proportion of fancy fruits that it produces over a relatively long bearing season. It has been tested in commercial plantings in practically all of the tomato-growing areas east of the Mississippi River from Maine to Florida, with a few scattered plantings reported we-tward to the Pacific coast. Although the results reported from these widely scattered tests have in most instances been remarkably successful, there

have been a few unfavorable reports, which are not surprising when any variety is tested over such a wide range of climatic, soil, and cultural conditions. The distinctive characters that would give the variety outstanding merit in one environment might cause it to be considered interior under another set of conditions. The Break o' Day has already been enthusiastically received in a large number of tomato-growing centers in which it has demonstrated its superior worth.

# Produces Good Quality Fruit Early

The Break o' Day combines the earliness of the Marvana parent with the approximate fruit size, shape, and quality of the Marglobe



Figure 139 - Fruit of Break o' Day tomato

parent. It is at least 10 days earlier on the average than Marglobe, and although it produces fewer early fruits than either Marvana or Earliana, it produces nearly as much early fruit by weight, and the fruit is superior to that of the other early varieties in size, solidity, color, and flavor. (Fig. 139.) The vines of the Break o' Day are small leaved and of an open, sprawling type which makes practically all the fruits visible to the picker without moving the foliage of the plant aside. In this respect Break o' Day is very similar to the Marvana parent, which has the Earliana vine type, although the Break o' Day vines are larger

Heavier foliage would no doubt give more protection to the fruit during very hot weather. However, sparse small-leaved foliage seems to be associated with early flowering and early setting of fruit, and since an early set of fruit is such an important factor in an early variety, the shortcomings of the scanty foliage are probably outweighed by its advantages.

# Resists Diseases and has Long Bearing Season

Break o' Day is resistant to Fusarium wilt of vines and to nailhead rust of fruits. It is also slightly resistant to blight, e-perially Septoria leaf spot and early blight. In many field tests the Break o' Day and Marglobe were practically free from blos-om-end rot when other varieties growing beside them were badly affected by it, and the fruits were not so susceptible to cracking as were those of most of the other varieties. It also withstood the prolonged hot dry weather of 1930 better than other varieties.

In yield, Break o' Day is superior to Earliana, for it not only produces approximately as much early fruit but on fertile soils usually continues to bear until killed by frost. Yields of 15 tons per acre were reported by several growers in the dry year 1930. Furthermore, the vines, which are well supported by an extensive root system, produce a large proportion of fruit of fancy sizes throughout the picking season, because of the habit of setting a uniform succession of fruits.

# Well-Ripened Fruits are Bright Scarlet

On the department's test plots where the Break o' Day lines were grown while the variety was being developed, the fruits ripened very evenly, passing successively during the ripening process from a yellow green to yellow red, finally becoming bright scarlet on the outside, with scarlet red internal color. However, during the intense drought and heat of 1930, and the heat of 1931, some of the fruits failed to develop a good color, especially at the stem end, and some scalded. This difficulty, however, was no more serious in Break o' Day than in other early varieties. The failure to develop a satisfactory color in the cases cited was probably due to the high temperatures, ranging from 90° to 108° F., which prevailed during the ripening period. The development of the red pigment of the tomato fruit is inhibited at temperatures above 86°.

The immature fruits are a light shade of green throughout their development until they enter the ripening stages. In tomato-growing areas where the tomatoes are picked and packed in the mature-green stage, this may sometimes cause premature picking, as the fruits of most varieties pass from a darker to a lighter green shade as they approach maturity, and this change of color is used as a picking indicator. The mature-green stage of any tomato variety can readily be determined, however, by cutting the fruit transversely with a sharp knife. When the seeds are pushed aside without being cut, the fruits are mature green. The color changes in Break o' Day fruits should be checked with this test until the picker is able to detect maturity from outward appearances, because tomato fruits picked before they reach the mature-green stage do not ripen well and therefore are of very inferior quality and flavor.

# Favorably Received by Growers and Shippers in Many States

Although the merits and limitations of a new variety can not be definitely determined until after it has been widely grown for a number of years, the results obtained thus far with Break o' Day indicate that it will occupy a position of considerable importance among early varieties of tomatoes.

The Department of Agriculture has placed Break o' Day seed with commercial seed growers to enable them to produce a seed crop for the seed trade. It has also placed seed samples with seedsmen for use in their trial grounds. Therefore an ample supply of seed should be available for the crop season of 1932.

WILLIAM S. PORTE, Bureau of Plant Industry.

RAIL Builder Developed For Use in Constructing

The largest single job confronting the Forest Service in the North-

National Forest Roads west is protecting the national forests from fire. Successful suppression of fires requires getting men, equipment, and supplies to the fire in a short time. While some fires occur within striking distance



FIGURE 140-The "trail builder" at work on the St. Joe River forest-road job, Idaho

of roads and trails, lightning, one of the worst foes of western woods, often starts fires in inaccessible places. To reach these fires before they spread is the problem. Every minute counts, and more roads and trails are a vital necessity.

To complete the protective and administrative road system within the national forests some 31,-000 miles of road must be built or brought

up to a higher standard. This involves the expenditure of some \$60,000,000, and no small amount could be saved if machinery were devised to handle material at costs comparable to those for highway construction. (Fig. 140.)

Construction for public travel of low-standard pioneer roads with a width of from 10 to 12 feet is declining. Modern trucks and automobiles have supplanted old types of transportation. Present travel on highways demands a greater width than that of the pioneer road

built to accommodate 2-way traffic.

Decline in low-standard roads has made manufacturers reluctant to invest funds in experimentation on machines for building them. Profits are much greater from producing machinery for handling the relatively large volume of material used in building the modern highway. Therefore, forest engineers had to undertake to solve their own problems.

### Necessity for Special Machinery

Use of ordinary highway-excavation machinery requires a roadbed much wider than the road necessary for forest use, and the cost of this wider roadbed, even when built with machinery, is more than the cost of a narrow road built largely by hand. This was the situation confronting Forest Service engineers when they sought machinery to build forest-development roads.

Formerly it was necessary to build by hand labor a trail not less that 6 feet wide to accommodate the small tractors and graders which built the balance of the road. This preliminary hand-built trail cost more than completing the road. Elimination of this handwork was a

big part of the problem.

There was on the market a so-called "back filler," a large blade-installed in front of a tractor and used for pushing dirt back into excavated trenches. With this machine as a base, experiments were car-

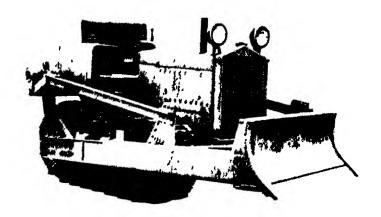


FIGURE 141.—The trail builder

ried on with various blades to determine which one would give the best cutting capacity, with a proper angle and a suitable lifting mechanism, the whole to be attached to a tractor of the proper size. (Fig.

141.)

Earlier experiments were made with small-sized tractors, but experience indicates that medium-sized tractors are best adapted for the work. The new machine is called a "trail builder," as it is used to build the original trail to a width of 8 or 9 feet, which is sufficient to accommodate tractors and graders which complete the road. The trail builder also grubs out small trees and brush. Its use has reduced the cost of forest-road construction almost 50 per cent.

The trail builder, as now developed for work in Montana and northern Idaho, was built by a Pacific-coast firm in conformity with plans and specifications submitted by the Forest Service, and is an attempt to correct weaknesses in previous models. Undoubtedly further prog-

ress will be made in perfecting the machine.

FRED E. THIEME, Forest Service.

RENCH Silos, Provided With Drainage, Are a Success in Humid Areas

A trench silo is merely a large trench dug in the ground with the ends on an incline so that a team or tractor can be driven through and prac-

tically all the work of construction done by power. The walls are finished smooth and nearly perpendicular with a spade. The width, length, and depth are varied according to the location or to the number of cattle to be fed. The idea of the trench silo is not new, since this type is merely a modified form of the pit silo. The construction of a trench silo, however, has the advantage of allowing all the excavating to be done without hoisting and does away with the necessity of materials for walls and of skilled labor for construction. These economies practically put a silo within the reach of any man who has time to dig one.

In parts of the West where there is little rainfall, trench silos have been used for a number of years, but they have found little favor in the East, where the winter rainfall is heavy. What is believed to be the first trench silo east of the Mississippi River was dug at the McNeill Experiment Station, McNeill, Miss., in 1926, after three stave silos had been blown down by winds of gale force. A pit 8 feet deep, dug several years before, led the writer to believe that there would be no trouble from caving walls and no serious danger of scepage, but there was doubt regarding the success of a trench silo in a region where the rainfall averages above 60 inches annually and is heavy in winter. However, a trial was considered worth while.

# Need for Drainage Is Evident

The first trench silo dug was 10 feet deep, 10 feet wide, and 75 feet long. The ground in which it was dug was practically level. The silo was filled in October with sorghum silage cut to a length of about one-half inch with an ordinary blower cutter having only one joint of vertical pipe. (Fig. 142.) The silage was kept well tramped down, especially along the side walls. When the silo was heaping full above the ground it was covered with about 6 inches of pasture clippings to keep the dirt from sifting through on the silage, and a team and slip scraper were then used to add a layer of about 4 inches of dirt. The dirt was wet down to make it pack and a caterpillar tractor was run over it at intervals of several days. The dirt next to the side walls was kept tramped down to make it follow the silage as it settled.

This silo was opened for feeding the last of December. Feeding was started from one end and a narrow section of the silage was fed out from top to bottom, only enough being opened up at a time to last about two days. About 2 feet of water had accumulated in the bottom of the silo and this was pumped off. As water accumulated from rainfall during the winter it was pumped off or dipped out. Practically no silage was lost from spoilage. It had a bright color and good aroma immediately underneath the dirt cover, even on the end slopes where

the depth was less than 1 foot.

Another silo was dug in 1927 in a location where a strong seep developed. At the time this silo was opened there was about 5 feet of water in the bottom. This water had to be pumped out every other day in order to feed out to the bottom of the silo, an operation which proved to be expensive. One or two feet of the silage in the bottom became water-logged and rank-smelling, but when fed with cottonseed

meal it was not refused by cattle although the seepage of such large quantities of water through it had probably caused a considerable loss of nutrients. This silo was again used successfully in 1928 but with the same trouble from water.

# Choice of Location Important

In 1929 a third silo was dug in what was considered an ideal location. The main part of the silo was in fairly level land but one end opened into a deep ravine. (Fig. 143.) Drainage was provided by gravity through a short ditch. This silo was dug with a tractor pulling three slip scrapers, and most of the earth was moved on the level or downhill into the ravine Three men and the tractor dug this silo to a capacity of



FIGURE 142 - Filling the original trench silo at the McNeill Experiment Station

130 tons in four days, with no expense of construction except for tractor and man labor. The water in the bottom of this silo has been drained as fast as it has accumulated, causing no trouble or expense whatever. The quality of the silage has been as good as any ever seen by the writer, the aroma being particularly mild. Cattle have eaten it greedily at all times without the addition of cottonseed meal.

As the location of the first two silos was such that they could not be drained by gravity, handling the water accumulating in them presented a problem until the very simple expedient of boring a hole in the bottom and letting the water drain off into the water table below was tried. An ordinary curb well auger was used to bore 23 feet to strike sand under the second trench silo, the drainage of which was particularly poor. The water was then turned into this well through a pipe with a strainer on the end. This took care of seepage water in

the silo where it had previously been necessary to pump every other day. When mud was allowed to wash into the well the drainage was stopped up but could be restored by jabbing with a pipe. The writer continued to use this silo but it was not so satisfactory as either of the other two.

As the original silo, in a level location, had some seepage in addition to the direct rainfall, a well was bored (fig. 144) in the bottom of it to a depth of 15 feet to strike sand. This well handled the water without further trouble. Such drainage will solve the water problem in locations where the water table does not rise above the bottom of the silo. The selection of a properly drained site near the fields where the silage



FIGURE 143 —Trench alo of 130 tons capacity dug by three men with tractor in four days. Ditch for gravity drainage is in left foreground

is produced may be a more important consideration than nearness to the barn. This is particularly true in the South where barn shelter is not necessary for cattle. Dairy cattle may have their concentrated feed while being milked and then can be turned out to go to their roughage. This plan saves the labor of hauling the roughage to the bain.

Surface drainage is easily accomplished by ditches, and with bottom drainage provided for there appears to be no good reason for building a roof over the trench silo. This would be expensive and would be in the way of both filling and feeding. The direct rainfall seeping through the

silage may cause a slight loss of nutrients but it will keep the silage moist and in good condition. Many above-ground silos are erected without roofs, the silage taking up all the direct rainfall.

# Small Cost in Proportion to Capacity

The only serious objection commonly advanced against the trench silo is the accumulation of water, but this objection has now been overcome. There are many advantages, particularly the economy of construction. A trench silo may be dug at odd times. No materials need be purchased and no skilled labor is required for construction. The trench silos described were constructed at a cost of 58 cents per ton capacity, which was materially less than for other forms of silo con-

struction. With proper care in filling and tamping along the side walls, no appreciable spoilage occurs in the trench silo. Less expensive machinery is required for filling this type, as the cut silage does not have to be elevated by power but can drop into the silo by gravity.

The silage is also easily removed; if desired, a carrier may be installed, as illustrated in Figure 144. The siloisstorm-proof and can not rot down. In six years' use the only cost for maintenance has been to clean out the bottom before filling. No serious caving has occurred, and any slight caving is not a real depreciation since the silo is slightly larger after the fallen dirt has been cleaned out.

It silage-cutting machinery is available at moderate cost in the neighborhood, trench silos can be dug and used successfully for herds as small as five or six cows and have been operated with success for one cow. The growing popularity of the trench silo has been almost spectacular. Several hundred trench silos have gone into use in Mississippi

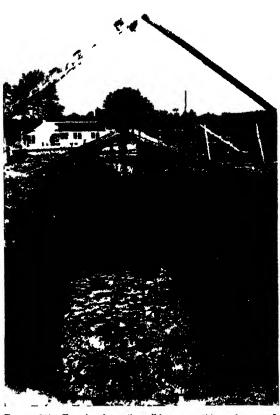


FIGURE 144 —Trench alo with well boring outht in foreground.

Feed carrier and track are in background

alone in the last three years and one county in Tennessee reports 50 dug in one year. No failures have been reported where proper drainage was provided.

S. W. GREENE, Bureau of Animal Industry.

TUBERCULOSIS Becomes a Serious Menace to the Poultry Industry

Fowl or avian tuberculosis is becoming a serious menace to poultry raising, particularly in the Middle Western States. Surveys made in

1927 indicated that tuberculosis was present in poultry flocks in more than 500 counties in these States. The badly infected areas have now extended until they embrace at least 750 counties, causing an enormous

loss of poultry, as well as of swine, which also are very susceptible to the fowl type of tuberculosis. Since disease in a flock increases the cost of production, sometimes to a point greater than the selling price of the product, it is imperative that all unnecessary losses be checked in order to save the industry from serious loss. As a means to this end Congress, in 1931, increased the tuberculosis-eradication fund so that more attention could be given to the eradication of fowl tuberculosis.

Plans for this effort were soon promulgated by representatives of the various poultry interests and by State and Federal livestock officials. These plans provide for cooperation between State and Federal livestock officials and all branches of the poultry industry. One phase of the plans provides that the work be conducted in restricted areas, where an employee of the State or Federal Department of Agriculture can visit each flock and demonstrate to the owner the presence or absence of tuberculosis by clinical inspection, tuberculin testing, or postmortem examination.

#### Disease Spreads in Various Ways

The disease is spread from flock to flock by the exchange of infected fowls which, however, may appear to be in perfect health. It may also be carried on shoes or grain sacks from infected pens. It does not appear that the disease is spread to any great extent by such birds as the English sparrow. The pigeon, however, is a carrier as it is susceptible to this type of infection. There seems to be but little danger of incubator chicks spreading infection, because infected eggs seldom hatch. When they do hatch, the chicks usually die within a few days. In view of these facts it is very important that breeding stock be purchased only from flocks known to be free from tuberculosis or that eggs be purchased and the stock raised under carefully guarded conditions.

#### New Ground Desirable for New Flocks

It is advisable to raise new flocks on clean grounds and to dispose of the entire flock at the end of the laying season or when the birds are about 18 months of age. Sanitation is important since the tubercle bacilli may live in protected places for a year or more. Disinfectants may be used to advantage on poultry houses and equipment, but it is not practicable to attempt to disinfect the ground over which the poultry range. Runs and pens should be plowed up and planted to some green crop whenever possible. An approved type of poultry house makes it easier to combat the disease. These recommendations, when followed, will greatly reduce and eventually eradicate tuberculosis and also many other diseases.

### Symptoms of the Disease

Flock owners should acquaint themselves with the symptoms of this disease so that it may be detected before extensive infection in the flock has occurred. The most common symptoms of fowl tuberculosis are ravenous appetite, general emaciation, extreme weakness, swollen joints, and pale wattles and comb. A diagnosis may be made by applying the tuberculin test which, however, should be done by a competent veterinarian. The lesions commonly found are yellowish white nodules (tubercles) in the liver, spleen, and intestinal wall.

The size of the lesions ranges from that of a small grain of sand to that of a hazelnut.

During the last fiscal year, the veterinarians engaged in the eradication of bovine tuberculosis inspected, as an adjunct to that work, approximately 21,000,000 fowls and found approximately 9,000 flocks infected with tuberculosis. Whenever an infected flock is located by these field veterinarians the owner is informed of how to eradicate the disease. The percentage of infected swine has been very materially reduced in many sections, a result which indicates that the farmers are following these suggestions.

#### Information Methods Used

Information on fowl tuberculosis and its eradication is being disseminated through the press and local publications and by posters and exhibits. Figure 145 illustrates a part of an exhibit used in spreading





Figure 145—Part of an exhibit, used to show the organs of a final that are most commonly affected with tuberculosis. An automatic lighting device first shows a seepingly normal him, at left, and then, by internal illumination, the evidence of discussion this same first.

information on fowl tuberculosis. The exhibit is electrically equipped so that it shows an apparently normal bird, and then, after a flash, the same bird with diseased organs clearly visible in their natural position.

The department also has a 2-reel motion picture entitled "TB or not TB," which deals with tuberculosis in poultry and swine. This picture is available for educational work and may be borrowed for such a purpose through the Office of Motion Pictures of the department.

ELMER LASH, Bureau of Animal Industry.

URNIPS Converted Into Appetizing Sauerkraut in the Same Way as Cabbage Many new foods have been suggested for the American table, and now comes turnip sauerkraut to take its place on the menu.

Turnips are converted into an appetizing dish by the same methods of fermentation that are used in making cabbage sauerkraut. The wide-

spread use of turnips as a fall forage crop on the farm insures a constant source of supply without the extra labor of planting a special crop.

It has been found through experimentation that a very good sauer-kraut can be made from medium-sized purple-top turnips. They should be firm, sweet, and juicy, because the proper fermentation and resultant flavor depend upon these factors. As turnips which have a woody or pithy flesh are low in sugar content, and possess a strong flavor or odor, they are not desirable for sauerkraut.

### Method of Preparation

The tops and roots are removed, and the fleshy material is either shredded or ground in order that the juice may be extracted from the plant cells and the sugar subsequently converted into lactic acid. The shredded or ground material is mixed and salted at the rate of 4 ounces of salt to 10 pounds of turnips. The mixture is then packed in stone jars, weighted down, and allowed to ferment.

The sauerkraut may also be packed in glass fruit jars for fermentation, but the lids must remain loose for the first three or four days in order to allow the gas formed in the early part of the fermentation to escape. After the evolution of gas has ceased, the lids are tightened, and the fermentation is allowed to proceed to completion, which will require

from three to four weeks.

Turnip sauerkraut may be stored at a low temperature for a considerable time, or it may be canned according to the method outlined in Farmers' Bulletin No. 1438, Making Fermented Pickles. Turnip sauerkraut possesses a sharp lactic flavor closely resembling that of good cabbage sauerkraut. Most of the characteristic turnip flavor is lost during the fermentation.

HARRY E. GORESLINE, Bureau of Chemistry and Soils.

TURPENTINE and Rosin Supply Essentials for Numerous Industries

Spirits of turpentine, oil of turpentine, or as more generally known, turpentine or simply "turps" is usually to be found in every coun-

try and town home. It is put to a hundred or more uses. Around the farm home it is ever ready, safe, and useful, either alone or mixed with other ingredients, as a liniment for people or domestic animals. Stokes' liniment (white liniment), for example, is an emulsion containing 40 per cent turpentine oil, 8 per cent acetic acid, 1.6 per cent lemon oil, and about 50 per cent water emulsified with the aid of eggs. Other liniments contain turpentine oil, ammonia, and camphor as the principal ingredients. In mixtures with mutton tallow or olive oil and gum camphor, turpentine finds a deservedly wide use as what the doctor calls a "rubefacient" to be rubbed on the chest and throat. It is a convenient article with which to remove greases and fresh paint from clothing. It is also used in wiping up and polishing floors, woodwork, and furniture, as a repellent for moths and vermin, and to clean porcelain ware and glass.

About 90 per cent of the turpentine produced in this country is used in paints and varnishes. The paint and varnish maker uses it for bringing his ready-to-use paints and varnishes to the right consistency and to hold in solution some of the ingredients. The master painter prefers it for mixing and thinning the paint which he puts on houses

and other buildings. The furniture maker is also a large user of turpentine. The makers of wax polishes for shoes, floors, and furniture are the next largest users of turpentine. They use more than 500,000 gallons annually as it is a good solvent for the wax they use and it gives a smooth product which has the proper consistency, dries at the proper rate, and has a clean pleasant odor. Sealing waxes and plastics, chemicals and pharmaceutical preparations, oils and greases, and printing inks are other products in which thousands of gallons of turpentine are used, and minor uses consume a total of more than 60,000 gallons annually.

The individual's use of rosin is perhaps more indirect but none the less real. The paper maker uses nearly 400,000 barrels (500 pounds gross) of rosin annually in sizing papers of all kinds in order that the newspaper will not tear; that goods wrapped in paper may not be so easily spoiled by becoming wet; and that the ink may not spread over the writing paper. About 300,000 barrels of rosin are used each year in making varnish. Many high-priced varnishes contain a large percentage of rosin or rosin compounds. Because of the insufficient supply of fossil resins (nature's modified and durable rosins) varnishes would cost much more were it not for ample supplies of rosin. Rosintung oil or rosin-ester-tung oil varnishes are among those in greatest demand.

Soap makers use annually about 225,000 barrels of rosin, some of it in high-grade toilet soaps, to which it gives certain desirable characteristics. The fact that rosin makes a good laundry soap helps to keep the price of such soaps stable, when the cost of fats, cils, and greases

would at times raise the price.

Paper making, varnish manufacture, and soap production, the three chief industries in which rosin is used, probably absorb about 90 per cent of the rosin made. There are, however, a number of other industries which consume many thousand barrels of this commodity. Linoleum making takes about 45,000 barrels; rosin oils and axle greases take 55,000 barrels; sealing waxes, pitches, and plastics need 40,000 barrels; foundries take 30,000 barrels in making cores and molds for castings of all kinds; printing inks take 15,000 barrels to give body to the inks; and 25,000 barrels or more are used for various minor purposes such as solder flux, battery seals, cable insulation, roofing, waterproofing compounds, asphalt emulsions, cellar cement, and paint driers. Rosin is also one of the ingredients of dehairing soaps used on the carcasses of hogs after the bulk of hair has been taken off, in order to take off the fine hair not removed in scalding.

Thus do turpentine and rosin, coproducts of the southern plantations and forests, supply essential raw materials for many important industries, and contribute to the individual well-being and comfort of

citizens.

F. P. VEITCH, and W. C. SMITH, Bureau of Chemistry and Soils.

URPENTINE Operators to Have Benefit of Forestry Demonstration A new national forest in Florida, the Osceola, has recently been acquired by the United States primarily to demonstrate the correct

handling of a comparatively large area of longleaf and slash pine land for the continuous production of turpentine, saw timber, and other forest products. This forest will eventually contain 145,000 acres of Government land. Its south boundary extends 15 miles along the main road between Lake City and Jacksonville; its north edge borders

the Okeefonokee Swamp.

Slightly over two-thirds of the area consists of pine flatwoods from which the original stand of longleaf and slash pine has been cut. In general, there is good reproduction of both longleaf and slash pine, the latter predominating. On a large part of the area there are good stands of poles and older trees just approaching the size for turpentining. There are also decadent older trees which have been turpentined.

Numerous swamps are scattered throughout the pinclands, one large swamp covering about 10,000 acres. These contain a mixed stand of cypress and hardwoods, such as gum and bay. The best trees have been cut, but there remain some good stands of timber merchantable

for ties and saw logs.

The unit was put under administration in December, 1929, after the Government had acquired 93,000 acres. Fortunately the area had been under cooperative fire protection with the State of Florida which had erected two towers and a telephone line upon it. These improvements were purchased from the State, and have been supplemented by fire lines and roads for fire-control purposes. During the fire season the forest is manned by the necessary lookouts and firemen, and in 1930 fire losses were held to 1.47 per cent of Government land burned over.

## Inventory Made of Resources

An inventory of the resources of the Osceola National Forest has been made and a plan for management of the timber is nearing completion. The forest will be managed primarily for production of naval stores on a sustained-yield basis. Timber operations in the pine stands are now confined to completing the turpentining of older trees already cupped and the salvaging of worked-out timber. Cupping of round timber will begin within five years and as the growing stock is built up, the annual harvesting of naval stores will be increased until the forest comes into full production in the course of the next 10 or 15 years. In the meantime, the disposal of large overmature cypress for saw logs and some of the younger trees for railroad ties will yield a good revenue. Management of the swamps will insure such products in the future.

A record of costs has been kept to determine the financial success of this project. The capital investment when purchases and improvements have been completed will amount to about \$850,000. The books show not only the investments, but the operating expenses, depreciation, and income. The forest will be developed according to sound forestry and business principles with the idea of showing not only how such an area can be brought into full production and kept there, but also whether it is profitable to do so.

Recently nearly 1,000 acres of round timber has been purchased on which the Forest Service will concentrate its major work in naval-stores research. Good practices developed here by laboratory methods and applied on the forest on a commercial scale will help to solve the

problems of the naval-stores industry.

Favorable Conditions in Some Great Plains Valleys

In the western part of the central Great Plains area and in the intermountain valleys immediately to the westward are

found numerous locations ranging in altitude from 4,000 to more than 10,000 feet where conditions are almost ideal for raising such vegetable crops as lettuce, cauliflower, peas, beans, and potatoes. To the northward, similar conditions are found at increasingly lower altitudes, where soil, water, and local climatic conditions are favorable. Such areas are usually protected mountain valleys, although often the mountainsides themselves provide suitable conditions.

#### Head Lettuce

The chief expansion in the culture of lettuce, cauliflower, and peas has taken place in Colorado, where a considerable industry has developed in the San Luis Valley, near Del Monte, near Avon, and in similar sections. The head-lettuce industry had its origin in 1918, when one farmer raised 10 acres of head lettuce as a crop following potatoes. From this small beginning the industry rapidly developed until in 1926 and 1927 over 13,000 acres of head lettuce was raised. It was during this period that the industry expanded into Wyoming, where a considerable head-lettuce industry sprang up near Laramie. Two years of partial crop failure and unfortunate marketing experiences were responsible for the decline of this particular venture.

The rise of the industry in Colorado is interesting in that it is typical of similar developments of the past in almost every branch of agriculture. Following the discovery that head lettuce could be so easily and profitably grown, many farmers undertook its culture. Most of them had never raised any crop other than potatoes and knew little or nothing of the cultural requirements of head lettuce, nor did they have the necessary equipment or marketing facilities. Under such conditions it was inevitable that many should fail in their earlier attempts. Overproduction of lettuce, inferior in quality, together with keen competition from California, Idaho, Washington, and other States that market their crop at the same time, all combined to eliminate the inexperienced growers and those who had taken up the enterprise as a speculation.

At the present time head lettuce and the other crops named are largely raised as a part of a general crop rotation. When new land is to be brought under cultivation it is first cleared of aspen or sagebrush, plowed, and a crop of potatoes raised the first year. These may be followed by head lettuce or by one of the other crops. The more progressive growers include alfalfa or sweetclover in the rotation. The former is generally preferred, since it furnishes feed for livestock and the later growth may be turned under as green manure.

Practically no commercial fertilizers except phosphorus carriers are used. It is sometimes applied to land showing a marked deficiency. When available, manure from a feed lot is the most commonly used fertilizer.

Soils selected for head lettuce are usually dark, rich, and loamy. They are most often found where aspen has been cleared. They contain considerable organic matter in the form of leaf mold, but this is rapidly exhausted under cultivation and must be replaced. Lighter types of

soil are sometimes found satisfactory but are generally considered the cause of tipburn. Where early fall freezes are likely to occur, land with a slight slope is preferred to the level land of the valley floor.

New York (also known as Wonderful, Los Angeles Market, Iceberg, etc.), is the most popular variety of lettuce grown. Iceberg is sometimes planted as a variety that is more likely to mature satisfactory heads during warm weather. The true Iceberg, however, is not as popular on the market as the New York type.

Practically all of the head lettuce is raised under irrigation. This may be of the surface, subsurface, or semisubirrigation type. Surface irrigation by means of furrows is by far the most satisfactory. In certain localities, as in the San Luis Valley, the water table is naturally high and subirrigation is practiced. This is accomplished by means of a large ditch surrounding or running through the field, raising the natural water table to within reach of the roots. In the semisubirrigation type the water table is raised as far as possible by means of subirrigation and the irrigation is completed by furrow surface watering.

#### Cauliflower

Cauliflower succeeds well at elevations of from 4,000 to 5,000 feet above sea level. At higher elevations the cold nights and often cool

days retard its growth.

For its best development, cauliflower requires a somewhat heavier type of soil than lettuce. It also requires a high percentage of organic matter, and applications of 20 tons or more of manure per acre are

Most of the cauliflower grown is of the Snowball type. The Colorado Agricultural College in its trials conducted at Fort Collins found the Improved Self-Protecting Snowball to be a very satisfactory strain.

Cauliflower requires a great deal more water than lettuce; its culture. therefore, is limited to localities where water is plentiful at all times. Any shortage of water, especially while the plants are nearing maturity,

is almost certain to result in a poor crop.

The exact extent of the cauliflower industry in this region is difficult to determine. Car-lot shipments from Colorado totaled 411 cars in 1927 and 843 cars in 1928.6 Probably the more important shipping points have not greatly changed since 1925, when Denver, Mesita, Pueblo, and San Acacio were the four most important.

#### Peas

Peas are the last of this group of crops grown extensively in this section. Here the climatic, water, and soil conditions seem especially favorable. The quality of peas is excellent because of the relatively cool weather found at these altitudes, which retards the conversion of sugars to starches. Marketing is also made easier, in that the pods may be left longer on the vines without injury after they attain edible maturity.

Considerable interest has been manifested in the production of peas for canning. At the present time, however, the most popular variety grown is the Dwarf Telephone or similar types. As this variety has rather large peas, and the public has been educated to associate small-

<sup>6</sup> U.S. Department of Agriculture, Statistical Bulletin No. 30,

ness of size with high quality, the canners hesitate to try to overcome this long-established prejudice. Conditions are exceptionally favorable, however, for growing peas for seed for those growers who are willing to plant improved strains and to give adequate attention to roguing off-type vines.

In 1925 the car-lot shipments of green peas from Colorado totaled 35. In 1927 shipments had increased to 149 carloads, and 348 carloads were shipped in 1928. These increases indicate a rather rapid develop-

ment of the industry.

# Dry Beans, Potatoes, and Seed Peas

The development of the high-altitude vegetable-growing industry in Wyoming is somewhat typical of what has taken place in other States of the central Great Plains area and the Intermountain region. While a diversity of crops is produced in small quantities, the main development has been in the raising of dry beans, potatoes, and to a lesser

extent seed peas.

The Pinto and Great Northern varieties of beans are raised under dry-land conditions on the Plains at altitudes around 6,000 feet. In the Big Horn Basin region considerable acreage is devoted to raising the Great Northern variety of bean under irrigation. Here, too, are raised some 10 varieties of peas and from 10 to 15 varieties of beans for seed. Some bean and pea seed is also raised in the Converse County area.

The bean industry has expanded from the production of 4,712 bushels in 1919 to a production of 726,000 bushels in 1930. Freedom of the crop from anthracnose has interested eastern seed companies in the

possibility of securing their bean seed from this region.

The Bliss Triumph is the principal variety of potato grown in Wyoming, and probably accounts for 75 per cent of the total acreage, of which the remainder is mostly devoted to Irish Cobbler. Much of this acreage is used in raising certified seed, Laramic, Goshen, Platte, Niobrara, and Converse Counties leading in its production. In 1930 there were 2,306 carloads of potatoes shipped from Wyoming. It is estimated that of this number approximately 400 cars were shipped as certified stock. All potatoes raised for seed purposes are grown under dry-land conditions, while the commercial table stock is largely grown under irrigation. It seems likely that future expansion of the industry will be largely in the production of certified seed for the more southerly potato-producing areas.

M. F. Babb, Bureau of Plant Industry.

EGETABLE Standardization and Variety Description Project is in Progress

For many years there has been great confusion about just what characteristics a certain variety of vegetable should possess.

There has been no authentic standard which seedsmen could use as a guide in producing seed stocks and which a grower or dealer could use as a basis for his conception of a variety. Ample evidence of this lack of agreement and of the absence of such standards is the many differently appearing products that growers obtain, all under the same varietal name. Vegetable growers, canners, and seedsmen have long

recognized the need of definite standards and adequate descriptions of the most important varieties; they have further recognized that only after such standards have been established can uniformity be expected in the offerings of seed in the trade.

Active work upon a standardization and varietal description project was begun in 1929 by the Division of Horticultural Crops and Diseases

of the Bureau of Plant Industry.

In order to establish a standard that will be useful all over the country, it is necessary to work on a nation-wide scale in as many of the important vegetable-producing regions of the country as possible. The varieties for which standards are to be established are being grown over a wide range of conditions, so that their behavior and characteristics can be determined in different locations. Precautions have been taken to prevent local or provincial opinions taking the place of broad national viewpoints. From the first, all workers involved in this project have kept in contact with the industries they are trying to serve. The opinions of various qualified vegetable growers, canners, seedsmen, and experiment-station workers in many different parts of the country are being utilized, and the final results are intended to show as accurate a cross section of the country's opinion as it is possible to obtain.

### Nineteen Experiment Stations Cooperating

The cooperation of 19 State experiment stations, scattered from Canada to the Gulf and from the Atlantic to the Pacific, has so far been enlisted in this project. The State workers have contributed greatly to the value of the results obtained, and the Department of Agriculture gladly acknowledges the splendid cooperation that has prevailed throughout this work. With the assistance of the vegetable-research committee of the American Seed Trade Association, a wide search has been made of American and European sources, and hundreds of stocks have been obtained from most of the actual producers of seeds of the crops under consideration.

The standard to be established for each variety is to be based upon and illustrated by material that is actually in existence, rather than upon an ideal specimen that would be so perfect as to be practically impossible of attainment. Ideal specimens and details of varietal characters are to be well illustrated, using natural colors when necessary.

Tentative descriptions and illustrations have been completed recently upon 18 of the most important market-garden and canning varieties of peas, namely: Alaska, Alderman, Daisy, Davis Perfection, Gom, Gradus, Hundredfold, Improved Advancer, Laxtonian, Laxton Progress, Little Marvel, Nott Excelsior, Surprise, Sutton Excelsior, Tolephone, Thomas Laxton, World's Record, and Yellow Admiral. The pea-variety studies were carried on at Washington, D. C., and at Sturgeon Bay, Wis.

Three years' field work and the descriptions and illustrations upon cabbage have been completed. Studies were made at Washington, D. C.; Norfolk, Va.; Clemson College, S. C.; Winter Haven, Tex.; Davis, Calif.; Madison, Wis.; State College, Pa.; and Greeley, Colo. The varieties studied up to this time are Early Jersey Wakefield, Copenhagen Market, Early Winnigstadt, All Scasons, Late Flat Dutch, Glory of Enkhuizen, Danish Ballhead, and Wisconsin Hollander.

The tomato varieties under consideration are Earliana, Bonny Best, Globe, Marglobe, Early Detroit, Gulf State Market, Stone, Greater Baltimore, and Santa Clara. The tomato work was carried on by the various collaborators at Ithaca, N. Y.; East Lansing, Mich.; Lafayette, Ind.; Davis, Calif.; Weslaco, Winter Haven, Balmorhea, and Nacogdoches, Tex.; and at Washington, D. C.

In both the spring and fall of 1931 and the spring of 1932, stocks of beet, carrot, and spinach collected from numerous sources in this country and in Europe were studied. A total of about 60 strains of beets are being considered, including the following varieties: Extra Early Egyptian, Crosby Egyptian, Early Eclipse, Detroit Dark Red, Edmand Blood Turnip, Crimson Globe, Half Long Blood, and Long Smooth Blood. Work on beets is in progress at Washington, D. C., in California, Texas, and Virginia. Workers in these same regions and also in Minnesota are studying about 60 strains of the following varieties of carrots: French Forcing, Oxheart, Early Scarlet Horn, Chantenay, Nantes, Danvers Half Long, and Long Orange.

More than 60 strains of the following varieties of spinach are included in the program at present: Virginia Savoy, Bloomsdale Savoy, Long Standing Bloomsdale, Virollay, Prickly or Winter, Gaudry, Victoria, Triumph, Princess Juliana, and King of Denmark. Spinach studies are conducted at Washington, D. C., and in Texas, California,

and New York.

#### Plan of Collaboration

Each collaborator records certain data in detail, gives his personal impressions, and takes photographs of the material, all by a prearranged plan, so that the results of all workers are on such a basis that they can be accurately compared and studied. After the season's work, all collaborators gather and thoroughly discuss and criticize all results and opinions. Tentative standards and descriptions have been prepared for peas, cabbage, and tomatoes, and these have been further subjected to the criticisms of qualified growers, technical workers, and seedsmen so that the comments of these persons can be considered in the final preparation of the results. The tentative standards were before the collaborators during 1931, and each description was carefully checked with the behavior and appearance of each variety in the field to determine how usable and dependable the description is and to complete whatever details might have been lacking. Thus the plan provides for testing the results before they are released for publication. Publication of results upon cabbage, peas, and tomatoes is planned for 1932, but those on carrots, beets, and spinach must necessarily appear

As one crop or a group of varieties is completed, additional crops and varieties will be added to the project until all of the more important ones have been considered. By the time it has been possible to go the rounds once it may be necessary to revise and bring up to date standards for crops worked upon earlier; and there should also be an opportunity to add to the lists some of the less important varieties. It will also be necessary to add descriptions of important new varieties which certainly will appear on the market from time to time. It is obvious that the task is one that must continue indefinitely in order to meet the changing requirements of the industries interested in varieties of vegetables and to keep abreast of the times.

It is believed that the establishment of authentic standards which are adequately illustrated and described will encourage the production of stocks having higher degrees of excellence and will afford valuable guidance for persons interested in improving the nature of their stocks. There should also be a tendency for seed producers to concentrate upon varieties of importance, and there will be far less argument and confusion concerning what characteristics any important variety should show.

VICTOR R. Boswell, Bureau of Plant Industry.

HEAT Bred to Resist Some Strains of Bunt May Succumb to Others

Marquis wheat has been grown for years in the spring-wheat region in general and has been considered rather resistant to stinking smut

(bunt). During the last five or six years, however, it has suffered severe attacks. For several years little smut appeared in the Ridit and Albit varieties, bred in cooperative experiments at the Washington Agricultural Experiment Station particularly for bunt resistance, but more recently these varieties have sometimes been smutted. Cooperative studies at the Washington station show that these apparent changes in resistance are not due to deteriorations. When care is taken that they are exposed only to normal conditions in the regions where they are grown these varieties are as resistant as ever. The increase in the amount of infection is due to new strains of the bunt organisms that either have developed in the areas or have been brought in from elsewhere and are attacking the heretofore resistant varieties.

The plant breeder who is attempting to develop new wheat varieties resistant to bunt is vitally concerned with the number, distribution, and disease-producing ability, as well as the origin, of these different smut strains. If the different smut strains are fixed and do not change, the ones that do not occur in certain regions may be excluded, where practicable, by plant quarantines; and the plant breeder then would have to develop varieties resistant only to those strains present in his region. If the different new smut strains appear spontaneously or originate by hybridization, the problem is greatly complicated. It then becomes necessary to test new varieties for resistance to all the known strains of the disease, and the breeder's job is long and continuous.

## Caused by Two Species of Fungi

Stinking smut or bunt of wheat is caused by two species of parasitic fungi known by their Latin names Tilletia tritici and T. levis. These two species resemble each other closely and can be distinguished only with the aid of a microscope. Under the microscope the surface walls of the spores of T. tritici appear rough or reticulated, while the surface walls of the spores of T. levis are smooth. The smutted kernel or bunt ball is a mass of several million of these spores, the reproducing bodies or "seeds" of these parasitic plants. The spore masses break up and the spores become attached to healthy wheat kernels during threshing and subsequent handling. When such smut-infested kernels are sown, the spores germinate with the seed. In germinating, each spore produces a short germ tube which bears at its tip 8 to 24 minute spores of another sort called sporidia. Recent cooperative studies at the

Washington Agricultural Experiment Station have shown that a culture from a single sporidium can not infect wheat plants, but that cultures from two sporidia, properly selected, can cause normal infection which finally results in the production of new spores. This means that what corresponds to sex exists in these smut fungi and that proper mating is necessary for reproduction. This mating is similar in its results to pollination or the union of sex cells in such plants as wheat and corn. When different strains of such higher plants are cross-pollinated, progenies result which differ from either parent, but combine parental characteristics in different ways. Some of these new hybrids also may possess characteristics not apparent in either parent. The same thing happens with the stinking-smut fungi.

### Hybridization is Possible

Careful experiments have demonstrated that hybridization is possible between the different strains of each of the two species of bunt and also between the two species themselves. As spores of both species are commonly found in the same wheat field, and, after threshing, even on the same wheat seed, it is probable that hybridization occurs in nature. This may account, at least in part, for the development of new strains of bunt and for the infection of varieties of wheat previously considered resistant. The appearance of new strains emphasizes both the difficulty of maintaining the resistance of a wheat variety to bunt and the desirability of thoroughly disinfecting new seed from outside sources to avoid introducing new smut strains.

H. H. FLOR, Bureau of Plant Industry.

WHEAT Growers in Central Great Plains Use Three Main Tillage Methods

Three general methods are used in growing winter wheat in the central Great Plains—by continuous cropping, on fallow, and

in rotation with other crops. There is a close relation in this section between the quantity of moisture in the soil at seeding time and the yield, and consequently the methods of seed-bed preparation that are most efficient in storing moisture are likely to be the most successful.

When continuous cropping is to be practiced, it is very important to begin tillage work at the earliest possible date after the crop is removed. Timeliness of the first tillage operation is of more importance than the implement chosen for the work, provided it is a good one and is operated at a reasonable depth.

For the first operation in the preparation of wheat-stubble land for wheat, both the plow and the lister have given good results. The latter has given slightly the higher yields, and following its use the sur-

face resists soil blowing a little better.

The 1-way disk and the Killifer chisel have not been used long enough in this section for their value to be fully determined. For three years at the Fort Hays branch station, Hays, Kans., these implements, when used at the same time and depth, have compared favorably with the plow and the lister.

Where such implements as the plow, 1-way disk, or chisel are used to a depth of 5 or 6 inches, the subsurface soil packer is a valuable aid in the preparation of a seed bed. It breaks up the larger clods, closes

or makes smaller the air pockets in the furrow slice, and retards the loss of water by evaporation. It also firms the soil over the straw and shattered wheat, keeping both damp for a longer period, thus acceler-

ating decay of the straw and germination of the seed.

Where the lister is used, the furrows are left open until there is sufficient volunteer wheat or weed growth to justify tillage. The furrows are then leveled with a ridge "buster" or any implement that will do similar work. If there be another growth of vegetation before seeding time, a surface working with the disk or a shallow cutting with the 1-way disk generally makes a satisfactory seed bed. If there be not sufficient moisture after listing to start volunteer growth by the latter part of August, the furrows should be leveled at that time, as it is not best to leave them open too late in the fall or too near seeding time.

### Methods of Handling Fallow

Where the time between the maturity of one crop and the seeding time for the following crop is too short for the storage of a considerable quantity of moisture, fallow generally produces better results than continuous cropping. There are numerous methods of handling fallow. It is not only more economical but gives as satisfactory results to leave the ground in stubble over winter, beginning work the following spring. The ground may then be plowed and thereafter surface worked as may be required to prevent vegetative growth; or it may be listed and later relisted, splitting the ridges, and then be leveled with the ridge "buster" and thereafter surface worked as required. If there is an early growth of spring vegetation, the ground may be disked or 1-way disked and the plowing or listing be delayed until in May. Plowing or listing just before the period of expected heavy rainfall prepares the ground to absorb the maximum amount of the rains.

When wheat is grown in rotations, if it follows a small-grain crop, the same method of preparation may be employed as is used in the preparation of wheat-stubble land in continuous cropping. If the wheat follows corn that has been well cultivated, it may be drilled among the stalks, or if the corn be harvested the ground may be shallowly 1-way disked. If the ground be loose and free from weeds, equally good results may be secured by drilling-in the wheat without any tillage.

Regardless of the seed-bed preparation, there should be sufficient surface tillage to prevent vegetative growth. Implements that will leave the surface slightly rough and cloddy should be selected for this tillage, so far as possible. This prevents soil blowing and favors the absorption of water.

A. L. Hallsted, Bureau of Plant Industry.

HEAT in U. S. Attacked By Three Smuts, Two of Them Widely Distributed Wheat is attacked by three smuts: Stinking smut (bunt), loose smut, and flag smut. Stinking smut and loose smut

are widely distributed in all wheat-growing areas in the United States, while flag smut is known to occur only in a limited territory.

### Stinking Smut

Estimates made by the Department of Agriculture in cooperation with officials of various States indicate that owing to stinking smut or

bunt there is an annual reduction of more than 18,000,000 bushels in the wheat crop of the United States. The estimated annual field

losses from stinking smut are given in Figure 146.

As indicated by its common name, this smut gives off a foul, fishy odor. When the smut is present in wheat to any considerable extent, this odor permeates the entire mass, and the smut and odor can be removed only by special cleaning and washing. The cost of this cleaning and washing is reflected back to growers through discounts or in some sections by a generally lower price for all wheat. Discounts may run from 3 to 10 cents or even more per bushel. To losses

in yield, therefore, must be added the market discounts smut, for which may range from \$45 to \$180 per carload, depending upon the amount of smut. Taken together, the market field and losses from stinking smut of wheat, even at moderate wheat prices, amount to well over \$15,000,-000 annually in the United States.

### Survey in Four States

In 1930 a operative survey in four wheat-growing States showed an average loss in yield of 2.8 per cent from stinking smut. This loss, together with market discounts, represented a total loss from smut of about \$5,000,000 to the wheat farmers these States alone.

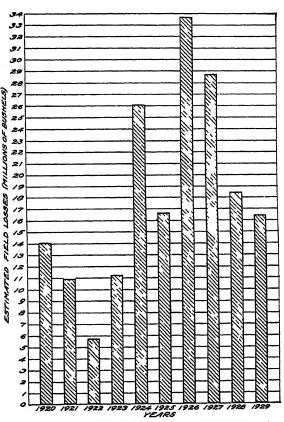


FIGURE 146 —Estimated annual field losses from stinking smut of wheat in the United States from 1920 to 1929, inclusive

In one county in Nebraska, where detailed records were kept from 1926 to 1930, it was found that stinking-smut losses averaged \$237,590 annually. In 1930 the loss from this disease on 1,000 farms in that county averaged \$276.87 per farm, or considerably more than the average annual taxes on the 1,117 farms in the same county. If surveys could be made in all wheat-growing areas, it is likely that similar losses would be found in other States.

Data from five terminal markets show that 23.1 per cent of all the cars received at these markets were graded smutty in 1928. The following year this percentage was 25.3, and during the first three months of 1930 the percentage was 31.1. It appears, therefore, that

losses from this wheat disease are increasing.

Recent experiments have demonstrated that the field loss from stinking smut is directly proportional to the percentage of smutted grains. The smut replaces grain that would have been produced without additional cost to the farmer. Further, it was found in the survey previously referred to that about 1 per cent or more of smutted heads in the field makes the threshed wheat grade smutty at the elevator. The clean wheat is contaminated by smut in threshing, and the entire crop is subject to a market discount if enough smut is present. It costs the grower about as much to produce an acre of smutty wheat as to produce an acre of clean crop, but he gets a lower return in both yield and price. Eliminating smut from the wheat crop is a direct gain to the farmer.

### Loose Smut

Loose smut of wheat causes an estimated annual loss in the United States of about 10,000,000 bushels. The extent of these losses is



FIGURE 147 —Estimated annual losses from loose smut of wheat in the United States from 1920 to 1929, inclusive

not often realized, because the smut on the headsis noticeable for only a few days before it blows away. At harvest time there remains only the naked central stalk of the head at the top of the straw.

While this smut occurs in all parts of the United States, it is rather rare in the arid Western States. On

the other hand, loose smut is rather destructive in the more humid eastern wheat-growing regions, where it causes losses of as much as 40 per cent in some fields. The estimated annual losses from loose smut in the United States for the 10-year period 1920-1929 are shown in Figure 147.

Losses from loose smut are a direct reduction of the field yield, due to a reduction in the number of sound heads of grain. In addition, it has been found from field experiments that wheat plants infected with

loose smut winterkill more easily than uninfected plants.

## Flag Smut

Flag smut was found in the United States in 1919, near Granite City and East St. Louis, Ill. Later observations have revealed its presence in several counties in Illinois and Missouri in the vicinity of St. Louis and in several counties in Missouri and Kansas near Kansas City. It is known to occur still in these areas of all three States.

In the United States losses from flag smut have been heavy only in individual fields of Harvest Queen wheat, which is very susceptible to this smut. In such fields, losses as high as 30 per cent have occurred. In resistant varieties the losses have been low. In some sections of Australia, flag smut destroys from 5 to 70 per cent of the plants in in-

fested fields. Both in Australia and in the United States flag smut is able to live in the soil from one crop to the next when wheat follows flag smut infected wheat. Under these conditions seed treatments do

not prevent infection.

While the areas infested with this disease in the United States are localized near the two original centers, there is no assurance that infected straw or seed may not be taken into other wheat-growing localities through the channels of commerce and thus spread the disease. The greatest danger from flag smut in the United States is in its possible spread to the more arid Western States, where susceptible varieties of wheat are grown under climatic conditions favorable to the disease, and where continuous wheat culture is practiced. There is also the menace of this smut spreading to uninfested sections, particularly in Kansas and Oklahoma, where Harvest Queen is the principal wheat variety.

The seriousness of the wheat smuts as factors affecting the economy of production must not be minimized. Even with limited infections the aggregate loss in the entire crop of the country is enormous. Most

of this loss can be prevented by control measures.

J. A. FARIS, Bureau of Plant Industry.

HEAT Loose-Smut Infection Prevented By Arid Climate Loose smut of wheat, commonly called "smut" or "blackhead," is different from stinking smut and flag smut, the other smuts of wheat. This smut is

very noticeable just as soon as the wheat heads out. (Fig. 148.) The diseased heads are almost completely destroyed by the smut. Instead of normal wheat chaff and flowers, black masses of smut, composed of the spores or "seeds" of the smut fungus, appear along the central stalks of the heads. The spores are easily shaken from the smutted heads, and very soon after heading the latter appear as bare stalks only. The spores may be carried for long distances by the wind or by insects or other agencies. This distribution of loose-smut spores takes place most abundantly at about the time the healthy wheat is in bloom. Some of the spores may lodge between the glumes or chaff of the sound wheat heads, where they germinate and grow into the very young wheat kernel inside the chalf. The smut fungus lies dormant in the mature kernel, but it resumes growth as the kernel germinates and spreads upward into the tender tissues of the developing wheat plant. Finally, when the wheat heads form, the fungus invades them and entirely destroys everything but the central stalk, masses of dustlike black spores taking the place of the flowers.

As the fungus is carried inside the seed, surface disinfectants that control stinking smut and other surface-borne smuts will not control loose smut. To be successful, a treatment must penetrate and kill the fungus without killing the seed. The hot-water treatment meets these requirements, but it is so difficult to apply that it is rarely used. Furthermore, it frequently causes some injury to germination. The most that can be expected from the hot-water treatment is the cleaning up of enough seed for a clean seed plot to serve as a source of seed for a

larger area.

## Control by Dry-Air Conditions

Recent studies in cooperation with the Idaho Agricultural Experiment Station have shown that, in the arid regions of the West, loose smut in wheat is controlled in nature by dry-air conditions when the



Here RE 118 — The appearance of loose smut in wheat (right) when the sound heads (left) are in bloom

plants are in bloom. This is the period when inoculation normally takes place, the smut dust or spores being blown from heads. Because of insufficient moisture in the air, the smut spores are unable to germinate in the flowers and infection does not take place. This relation to moisture in the air accounts for the prevalence of loose smut of wheat in the humid parts of the country and under irrigation, and for the rare occurrence of this disease in the dry-land areas of the West.

The only feasible method of controlling loose smut in the areas where it is serious is the use of seed free from infection. The alternative of the hot-water treatment is special seed plots protected against infection, the clean seed for these plots being either treated with hot water or obtained from an area known to be free from the disease. The difficulty of the hot-water treatment even on a small scale makes preferable the seed from a known disease-

free source.

In the case of varieties grown in both humid and arid areas, disease-free seed should be easily obtainable. Where the humid-area variety can not be obtained from arid sources, arrangements might be made for specially growing the pooled requirements of a number of farmers. Handled through a county farm bureau, a county agent, or other similar agency.

a county agent, or other similar agency, a satisfactory arrangement could be made at a reasonable cost. The knowledge of humidity requirements governing infection also should make it possible to adjust irrigation practice in irrigated areas so as to effect natural control.

V. F. TAPKE, Bureau of Plant Industry.

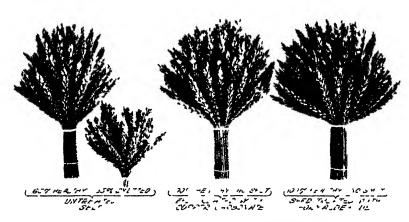
HEAT Loss from Stinking Smut Can Be Reduced by Disinfecting the Seed Serious losses from bunt or stinking smut in wheat can be prevented by properly cleaning and treating the seed before

sowing, except in the dry-farming regions of the Pacific Northwest and possibly in other areas where the soil may be infested with bunt spores. In such areas, while seed treatment does not entirely prevent bunt, it greatly reduces it. Bunt under these conditions may be combated by a combination of seed treatment, cultural practices, and the use of immune or highly resistant varieties. Fortunately, soil infestation is

serious only in a relatively small part of the great wheat-growing area of the United States. Seed treatment, therefore, may be recommended generally as a wise farm practice.

## Cleaning the Seed Important

Seed wheat should be very thoroughly cleaned before any kind of seed treatment is applied. Nearly all wheat as it comes from the threshing machine contains foreign material, weed seeds, other grains, and some small, shriveled wheat kernels unfit for seed. If the crop is smutty, the wheat also will contain many smut balls. Good practice demands that these materials be removed from the wheat before it is treated or sown. It is doubly important to remove the smut balls before treatment; otherwise the seed treatment is much less effective. (Figs. 149 and 150.)



First RL 119.—Wheat from seed with smut balls removed before treatment

#### What Treatments to Use

After the seed wheat has been thoroughly cleaned and smut balls removed, it is ready for treatment. There are two methods of treating seed grain now in general use—the dry or dust method, and the wet or formaldehyde method.

The Dry Method

The chief advantages of the dry method are: (1) It is easy to apply; (2) it does not cause seed injury, even when the treated seed is stored for weeks after treatment; and (3) it protects treated seed from weevils and rodents.

Copper carbonate is the most widely used and, on the whole, the most satisfactory dust fungicide now on the market for controlling bunt. There are two forms in general use—the pure copper carbonate containing about 50 per cent metallic copper, and various diluted or extended brands containing from 18 to 30 per cent metallic copper. The former should be used at the rate of 2 ounces per bushel of seed and the latter at from 2½ to 3 ounces per bushel.

Copper carbonate should be applied to the seed with a machine that thoroughly coats every kernel with the dust. The dust should never be applied by mixing it with the seed on the barn floor or in a wagon box by means of a shovel, or by stirring it into the seed by hand in the drill box. Such methods result in improper treatment and failure to control bunt.

The most common method of applying copper carbonate to seed wheat on the farm is by means of the common homemade barrel type of duster, which is very effective if properly constructed and used. Directions for making an inexpensive duster of this type may be obtained by writing to the United States Department of Agriculture. The barrel mixer is filled to not more than one-third of its capacity with the thoroughly cleaned seed wheat, the proper amount of dust distributed from one end of the barrel to the other, and the mixer turned for about two minutes at the rate of about 30 revolutions per minute. The wheat is then placed in sacks ready for sowing. Two men can treat about 15 to 20 bushels per hour.

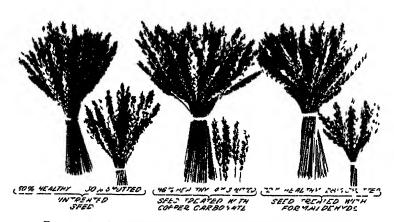


Fig. R: 100 - Wheat from seed with smut balls not removed before treatment

For dusting large quantities of seed, there are on the market a number of commercial power dusters with capacities for treating from 30 to 300 bushels of wheat per hour. Some of these can be combined with power cleaners so that both the cleaning and treating are done in one operation.

In some localities wheat can be effectively cleaned and treated for a reasonable charge at a mill or elevator well equipped for that purpose. In several sections of the country portable combination cleaners and dust treaters, which go from farm to farm, have been very successful.

### The Wet Treatment

Formaldehyde solution is the liquid most commonly used in the wet treatment of wheat for bunt control. Before or during seed treatment with formaldehyde all smut balls must be removed from the seed if the treatment is to be effective. The formaldehyde solution does not penetrate the oily material of the smut balls and therefore does not

kill the spores in them. In handling the grain after treatment these smut balls are broken and the seed is again infested with viable spores. The formaldehyde treatment does not protect the grain from this recontamination as copper carbonate does to some extent. (Figs. 149)

and 150.)

The only thoroughly effective way of treating bunt-infested wheat with formaldehyde is by soaking the seed in an open container in a 1:320 formaldehyde solution made by mixing one-half pint of commercial formaldehyde in 20 gallons of water. The well-cleaned seed wheat is poured slowly into the solution and stirred at the same time so that any remaining smut balls may rise to the surface and be skimmed off. After the wheat has been in the solution for about 10 minutes, the solution is drained off and the treated seed spread out on a clean floor or canvas to dry. When sufficiently dry, it should be placed in clean sacks and sown at once. Sacks previously used for smutty wheat should be soaked in the above solution before being used for treated seed. It is well also to wash out the drill box and spouts with the same solution before sowing treated seed.

### Removal of Smut Balls Essential

Soaking the seed in sacks in this solution, sprinkling or spraying the seed with a more concentrated solution, or any other method of applying the formaldehyde treatment that does not include removing the smut balls, usually results in poor bunt control unless the smut balls have been completely removed in cleaning the seed. For the farmer who has much seed to treat with formaldehyde, there are machines on the market for this purpose. Before purchasing a machine, however, he should be certain that it thoroughly wets every kernel with formaldehyde and that it removes the smut balls.

If the smut balls can not be completely removed by available cleaning equipment, it is usually advisable to procure seed wheat that does not have smut balls in it. Such seed wheat also should be treated before sowing, because there might be smut spores on the seed even though no smut balls are evident. It is good insurance to treat the seed every year. Badly smutted wheat should not be used for seed at all.

R. W. LDUKEL, Bureau of Plant Industry.

HEAT Strains Resistant to Flag Smut Afford Best Means of Control

Flag smut appears in the wheat plants in spring as dark-colored stripes running lengthwise in the leaf blades and sheaths. (Fig.

151.) These stripes are first gray in color, and later become black. They are filled with dark-colored spores or "seeds" of the fungus parasite. Infected plants rarely produce normal heads. Spores from these infected plants may become attached to wheat kernels in harvesting and threshing or may fall on the soil. They may be blown by the wind or carried by water or by other means, such as threshing machines or other farm implements, men, or animals, for considerable distances from the infected plants. When smutted wheat is sown or when clean seed is sown in infested soil the smut spores germinate when the wheat germinates, and the young wheat seedlings are penetrated by the minute threadlike germ tubes of the fungus. After entering the seedling

these fungus threads grow up through the tissues of the wheat plant from which they obtain their food. They live in the plant until spring, when they begin to produce the dark-colored spores that are seen as black stripes in the older wheat plant.



FIGURE 151.—Leaf blides and sheaths of wheat plants showing the blick stapes caused by flag smut

### Control Measures

Flag smut may be held in check and reduced in quantity by judicious quarantine, seed treatment, crop rotation and other sanitary measures, and by growing resistant varieties of wheat. The percentage of infection is also influenced by soil and weather conditions at the time the wheat is sown. Quarantine and sanitary measures include the regula-

tion of shipments of infected grain and straw; the disinfection of farm machinery, etc., when leaving an infested area; the burning of straw; and the treatment of seed grain. On account of the limited occurrence of flag smut in the United States, a Federal quarantine has been placed against the importation of wheat from all foreign countries where flag smut is known to occur.

### Seed Treatment

Seed treatment will destroy the spores of flag smut carried on the seed. The copper-carbonate dust treatment recommended for controlling stinking smut or bunt of wheat is the most satisfactory treatment. However, none of the seed treatments prevents infection of wheat seedlings by flag-smut spores present in the soil.

### Sanitary Measures

Because flag-smut spores easily survive in the soil from harvest to seeding time and are present to infect fall-sown wheat, it is especially important that infested fields be sown to other crops the following year unless a resistant wheat is used. The continuous growing of susceptible wheat on infested land may result in an increase of the disease, as has been found in Australia. Flag smut affects only wheat, therefore any other crop may be grown in the rotation with safety.

Any material that may contain flag-smut spores, such as straw or manure, may serve as a source of infestation when applied to the land. For the best results infested crop residues and infested manure should not be returned to soil that is to be sown to wheat within a year. The safest place in the rotation to apply such material is on the wheat stubble before a crop other than wheat.

### Resistant Varieties

The use of resistant varieties promises to be the most satisfactory means of controlling flag smut. Among the resistant wheats available in commercial quantities for growing in the flag-smut area are Shepherd, Trumbull, Gladden, and Fulhio. A few resistant selections of Harvest Queen have been found, but these are not yet increased for distribution. There are other highly resistant wheats that are less adapted to the infested area. The susceptible wheats that are grown commercially in the infested area and that should not be sown there are Flint (May), Fultz, Harvest Queen (Salzer Prizetaker, Red Cross), Jones Fife, and Red Wave. If these susceptible varieties are replaced by resistant varieties that do well in the infested area, serious losses from flag smut should be climinated.

V. F. TAPKE, Bureau of Plant Industry.

HEATS Bred for Smut Resistance Combined with Yield and Quality Differences in the reaction of varieties of wheat to smut or bunt have been recognized since 1901. An almost complete range from

immunity or strong resistance to complete susceptibility has been obtained among different varieties. Smut is more injurious to winter wheat than to spring wheat, but since the distribution of certain new varieties, it is becoming more prevalent in spring wheat.

The two species of bunt and strains within each species have complicated the testing of the reaction of wheat varieues. Based upon the infection of different varieties, there appear to be greater differences between some strains of smut within a species than between the species themselves. Martin and Hussar, winter-wheat varieties, were immune from smut in many experiments but recently have been found to be very susceptible to certain strains of smut occurring in the Pacific Northwest. Outside of this section different strains of smut have not become a serious problem to the wheat breeder. Some varieties, such as Oro and Ridit (selected and bred at the Oregon and Washington experiment stations), and Hope (developed in South Dakota) are resistant to almost all of the known strains of smut. Other varieties are resistant to one or more strains of bunt, while still others are susceptible to all known strains. Outstanding among varieties resistant to some strains are Sherman and Regal, hard red winter wheats selected for bunt resistance and distributed from the Sherman County branch station, Moro, Oreg., and Albit, which was developed by hybridization at the Washington Agricultural Experiment Station. Marquis, the principal commercial variety of hard red spring wheat, has some resistance to bunt, and probably less serious losses have occurred in spring wheat than if other varieties had been generally grown in its place. Less smut has been obtained in Hope spring wheat than in Marquis or any other spring variety.

Smut reaction has been studied in numerous wheat crosses involving immune, resistant, and susceptible varieties. The immunity from some strains of bunt possessed by the two winter wheats Martin and Hussar has been found to be inherited in a rather simple manner. In crosses between other varieties the inheritance is more complex and the difficulties of the plant breeder are therefore considerably greater. Aided by an increasing knowledge of the mode of inheritance of bunt reaction in crosses, breeders are producing new wheat varieties which

are immune from or resistant to the disease.

Important commercial varieties have been crossed with immune and resistant varieties in order to combine this smut reaction with other desirable characters such as high yield, rust resistance, and good milling and baking quality. Many hybrid strains thus developed are now being tested for yield and quality and for resistance to bunt. Some of the bunt-resistant varieties already developed, particularly Ridit, are grown to a considerable extent on farms. The development and growing of resistant varieties is a promising method of smut control, particularly for those areas where soil infestation reduces the effectiveness of seed treatment. However, when resistant varieties are grown, seed treatment should be practiced every few years to control infection in susceptible mixtures in the variety or the increase of any virulent new form of smut.

J. ALLEN CLARK, Bureau of Plant Industry.

HEAT'S Deterioration in Farm Storage Bin Tested Experimentally

The principal reason for wheat's going out of condition while in storage is high moisture content. This moisture content can be estimated

to some extent by the way the grain threshes and handles. If the grain threshes or combines easily, rattles when handled, and is hard to bite, it

probably is safe for storage. If the weather has been hot and dry, it is a good indication that the wheat is dry. While in storage the grain should be examined from time to time for odor, temperature, and weevils.

When wheat goes out of condition, the germination is decreased, the rancidity—which is a measure of soundness—is increased, and the grain becomes musty, sour, and hot. Grain in this condition is unfit for making flour. Wheat in various stages of deterioration adds to the problem of marketing. The difficulties in grading during the years of wet harvest seasons are greatly increased.

During the summer of 1930 about 100 bushels of damp wheat containing approximately 17 per cent of moisture was placed in a small farm-storage bin at Arlington farm, an experimental farm of the department near Washington, D. C. The bin was equipped with electrical resistance thermometers, so that the temperature in its various parts

could be determined.

The average temperature of the wheat on August 22, when the wheat was placed in the bin, was 78° F. For several days the temperature of the wheat varied somewhat according to the temperature of the outside atmosphere. Fifteen days after the wheat was placed in the bin the temperature of the wheat, 1 foot below the surface, was 101°. Six days later the temperature at that point was 122°. It took 14 days for the temperature of the wheat in that part of the bin to increase from 78° to 101°, an increase of 23°. Six days later the temperature was 122°, an increase of 21°. The temperature of the rest of the bin compared with that of the top portion.

The germination of the wheat at the beginning of the storage experiment was 97 per cent. On September 15, at the end of the test, the germination was 69 per cent for the top portion of the grain. Wheat from the center of the bin germinated 11 per cent and at the bottom

showed no germination at all.

The rancidity of the wheat was represented by an index figure of 7.32 at the beginning of the storage experiment. The rancidity index at the close of the experiment was 13.22 at the top of the bin, 24.88 in the

center, and 26.27 at the bottom.

The moisture content of the top of the grain on August 22 was 16.5 per cent and decreased to 14 per cent at the end of the experiment. The damage was not so great at the top of the bin, due to the drying of the wheat in this position.

## Drying the Damp Wheat

On September 17 the wheat was taken from the bin and placed in the open air on a platform about 20 feet square. The wheat covered approximately one-half of the platform, which gave room for turning.

The average moisture content of the wheat, when it was placed on the platform, was 16.3 per cent. Eight days later the average moisture of the wheat was 14.5 per cent. The top 2 inches had a moisture content of 12 per cent. The wheat was handled on September 18, 19, 20, and 22; twice on September 26; and once on September 30. On October 1 the top 2 inches of wheat had a moisture content of 12.1 per cent and the average for the pile was 13.6 per cent. On October 23 the moisture content of the top 2 inches was 11.3 per cent and the average of the pile was 13 per cent.

There was practically no rainfall and the humidity of the atmosphere was low during the drying period. If there had been rainy weather with high humidity during this period, or during a part of the

time, the drying would have been slowed to some extent.

The practice of spreading grain to dry is common with farmers. In some years when the prices are low and the farm has no storage space, sound, dry wheat is piled on the ground. Wheat stored in this manner for any length of time is usually badly damaged. This damage lowers the grade and the price of the wheat, and causes many marketing complications.

This experiment corroborates what is generally known. It is always best to have the wheat dry enough for storage before it is threshed or combined. Sometimes it is impossible to do this because of a wet

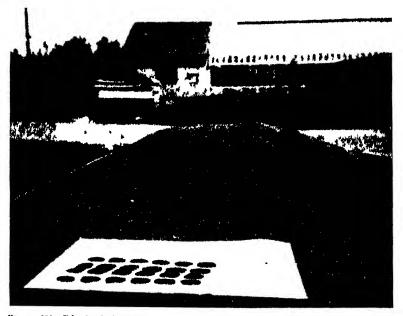


Fig. 11 152—Pile of wet wheat in the open, showing grain trier, sampling cloth and grain from four probes on the cloth

season. During such a year every agency is taxed to the limit to put the wheat crop into proper condition for storage. It is possible to dry some of this wheat by piling it on a platform and exposing it to the sun and wind. The wheat must be handled in order to dry it properly, and must be kept covered with a canvas during rains.

JOHN H. Cox, Bureau of Agricultural Economics.

ILTSHIRE Sides for Export Should Meet English Requirements

English butchers do not cut up a hog carcass into such common American cuts as fresh pork chops, picnic shoulders, and butts. (Fig. 153.) They

merely remove the shoulder blade, the back, the neck and aitch bones, and put the entire side of pork in cure.

When these cured, smoked "Wiltshire sides," as they are called, are cut up for the English retail trade, the butcher prepares the primary cuts illustrated in Figure 154, then slices off portions of these for his trade as required. The slices are usually thick and may contain portions of the spare ribs, back fat, plate, ham, skin, or other product, depending upon the part of the carcass from which they are taken. A

slice of English bacon cut across the loin includes: A portion of the belly, a chop, as we know it in the United States; a portion of back

fat; and a section of skin.

country.

Imagine an Englishman's dismay if he should buy a slice of untrimmed loin from a typical well-fattened American lard-type hog. His purchase would consist of about one-third lean, one-half fat, and the rest bone and skin. Exporting that kind of Wiltshire side to England would probably be as unprofitable as trying to sell untrimmed pork chops in this

In the United States consumers are less directly concerned with the type of hog. Excess fat on the loin is normally trimmed off by the packer. Frequently that on the ham and shoulder and sometimes that on the bacon are also trimmed off. In England the consumers buy the bacon as it is and protest justly if there is too great a proportion of fat. This has led producers catering to the English market to breed and feed a type of hog that will produce a Wiltshire side with a desirable proportion of lean to fat. This means that the loin must be covered with

a moderately thick, even layer of



Fig. 187 153—Side of hog showing stindard cuts in the United Stites: a, Feet, b, lam; c, bucon, d, loin, e, menic shoulder; f shoulder butt, g, buck fat

fat. The carcass must be such that a slice of English bacon will be attractive, economical, and not wasty to the consumer. (Fig. 155.)

## Wiltshire Sides of Five Countries Compared

American hog producers can meet the requirements of type and finish if they wish to do so. Evidence of this is shown in an importation by the United States Department of Agriculture of 20 Wiltshire sides from the Liverpool market. These sides originated, four in each of the following countries: Denmark, Ireland, Sweden, Poland, and the United States.

These 20 sides were fairly uniform in length but differed considerably in width, thickness of fat over the back, and in thickness and



Traver 15;—Wilishire side with method of cutting indicated a, Gammon, b, fore end, c, long loin d, back byon, c, thick steak f, thin steak, g, flank

proportion of fat in the cuts. The backfat thickness had a definite influence on the bacon grade, the fatter sides being graded lower by the foreign graders.

The best American sides in the shipment compared favorably in quality with those from other countries, as indicated by general appearance, and possessed desirable back fat with respect to average thickness. They showed the greatest variation, however, in thickness of back fat from shoulder to ham. The proportion of lean to fat was as desirable as in any of the other sides. Doubtless there are many market hogs in this country which do not show such desirable export type and finish, but suitable hogs can be produced by those who understand the demands and methods of the English trade and adapt their production methods accordingly.

### Cooked Meat Tests

These 20 imported sides were cut into the English retail cuts and the loins and hams (gammons, as hams are called in England) were roasted at the Bureau of Home Economics. The cooked meat was tested for palatability by the official grading committee of the department's meat research staff. It is of more than passing interest to note that the American pork, with particular reference to the loins, was almost unanimously declared to be too salty. Loin samples from

Denmark, Sweden, and Ireland were milder and more desirable. This was not the case with the gammons. The American gammons were graded a close second, the Danish being slightly more desirable.

The fact that the most lightly cured Wiltshires had remained sound during shipment from the respective countries of origin to England and from England to the United States suggests that a milder cure than that found in the four American sides returned from Liverpool could be used in American sides of



Figure 155 — Distribution of fat and lean in primary Wiltshire cuts  $\epsilon$ , Long loin, d, back buton, e, thick streak, f, thin streak. (Cuts are design ited with same letters as in fig. 154)

in American sides for exportation to the English market.

From observations made on these imported Wiltshires, it would appear that the type of hog necessary for the production of satisfactory Wiltshires closely approaches the type which will produce the most desirable American cuts. Whether the swine grower is raising hogs for export or for the domestic trade, he will find that those possessing quality and a relatively high proportion of lean to fat will find greatest favor at the market. The problems of breeding, feeding, and management must be studied in their relation to the practical production of quality pork whether the final product is to be exported or used at home.

R. L. HINER, Bureau of Animal Industry.

OODLANDS on Farm an Important Factor in Timber Survey

The farmer owns nearly one-third of all the forest land in the United States. (Fig. 156). But what do the farmer's acres contribute to the

total timber supply of the country? How rapidly are his woods being reduced by cutting, tree diseases, insect attacks, fire, grazing, and other means? How much of his timber does the country need? Is the farmer getting full value from his wood lot now, and can he get more?

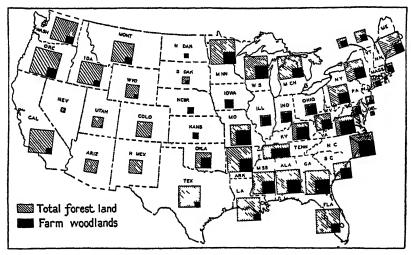


FIGURE 156 -The firmer as a timber owner

These are a few of the questions comprised in the one big question: "What are this country's actual timber resources and how do they actually meet present and future needs?" This question has never been answered accurately for the country as a whole, or even for any one State. Forest-conservation policies and practices have been based largely on rough and unreliable estimates, because a census or survey of the country's forest resources and timber needs, broad enough to furnish facts instead of guesses, is a project involving years of effort and millions of dollars.

In 1928, however, Congress passed the McSweeney-McNary Act, grouping all the activities of Federal scientific forest investigation into one big program. Section 9 of this act authorized the Secretary of

Agriculture to spend \$250,000 a year for 12 years, in cooperation with the several States—

in making a comprehensive survey of the present and future requirements for timber and other forest products in the United States, and of timber supplies, including a determination of the present and potential productivity of forest land therein, and of such other facts as may be necessary in the determination of ways and means to balance the timber budget of the United States.

## Survey Well Under Way

The forest survey thus authorized is now well under way. Briefly, it follows four lines of investigation: Stand, depletion, yields, and requirements. First, how much timber has the United States now standing—in mature saw timber, in cordwood, and in young growth coming in on burned or cut-over forest land? Then, how fast are forest use and forest enemies reducing present stands? To balance against the answer to that question, there must be accurate figures showing how fast the present forests are growing—how much wood is grown each year to counterbalance use and loss, and how much might be grown with adequate fire protection and forest management? Finally, how much wood does the United States need, and are its needs increasing each year or lessening? In short, is this country facing a timber shortage or shallit have, as some claim, more than enough wood for all future needs?

The farmer is not only a large timberland owner, and therefore a potential producer of a considerable part of the country's timber supplies, he is also a large consumer of lumber and cordwood. From the survey he will learn a great deal about the location, extent, and character of his own future timber supplies, as well as the part he can play in producing wood for the Nation, and where future markets for farm woodlend products will be found.

woodland products will be found.

C. M. GRANGER, Forest Service.



## MECHANIZATION SLOWS AS MORE OUTPUT AND LESS DEMAND LOWER PRICES

Implements and machinery available for use in farming have been an influence of first importance in determining the prevailing type of farming in terms of size of farm, production program, and capital requirements. But the influence that each new invention in farm machinery has had on American agriculture has been closely limited by the nature of the farm land in each part of the agricultural area. Further, machinery alone has always been inadequate to bring about a full-rounded development of the agriculture of any region. There must be an economic motive for the utilization of machines strong enough to make their manufacture and sale profitable and to encourage a period of tedious and expensive experimentation in developing the machinery. In the long run, the demand for the production which the machine facilitates, is the most essential motive in its utilization

The period since the World War has witnessed a remarkable acceleration in the readaption and use of agricultural machinery, with attendant expansion in agricultural production, both in this country and abroad. Further development in mechanization must be conditioned: (1) By the adaptability of the various portions of our agricultural area to the practical and economic use of new implements; (2) by the extent and character of the demand for the commodities whose production may be increased by the new machines; (3) by the degree of success with which these machines fit into the present organization of farms, or could be fitted into a system reorganized on the basis of the use of new machines and new practices which they induce, and the type of financial and business organization necessary to make their use both technically successful and economically feasible.

In general, the liberal use of machinery has been inseparable from a high degree of commercialization in agriculture. Frequently the invention of a single machine, which met a keenly felt need in the technical processes of production and thus removed an essential limitation to volume of output, resulted in a remarkable expansion in

a given type of agriculture.

The most outstanding example in American agriculture probably was the invention of the cotton gin late in the eighteenth century. This invention, with subsequent improvements, was the prime factor in the rapid spread of cotton production. Mechanization in planting

and cultivating cotton never progressed very far until recently. For years relatively low-priced labor enabled growers to furnish a sufficient supply of cotton at relatively low production costs. Shortly after the World War exceptionally heavy boll-weevil damage in the older cotton areas resulted in relatively low production and good prices; and cotton growing in the subhumid sections of Texas and Oklahoma was greatly expanded. These areas are particularly suited to the use of machinery, and here the mechanization of cotton farms

has been considerably developed.

Another important example of key inventions releasing forces that make for rapid agricultural expansion was the invention of the reaper early in the nineteenth century. The production of small grains, particularly of wheat, in the earlier times and in more primitive countries, had been characteristic of self-sufficing, small-scale farming. The daily bread of the peasant and the feed for his flocks and herds, so far as they were given rations of grain, depended on primitive handlabor methods to so large an extent that no very large surplus was produced for market. Russia produced a surplus of grain under primitive technic but large production for export was not forthcoming until there was a considerable utilization of modern tillage and harvesting machinery. In the United States, the first implement to promote rapid development of the Middle West was the steel plow, which facilitated the plowing of heavy prairie soils. Then came the invention of the reaper, the grain separator, and hay harvesting machinery, all within the 30 years before the Civil War. The Civil War, by increasing the demand for food products and making labor scarce, gave impetus that led to a rapid expansion in the use of these machines. Great expansion in the farm area in the upper Mississippi Valley came in the decades following the Civil War, and resulted in a heavy exportable surplus of grain. About this time the binder began to replace the reaper. This period marked the rapid spread of wheat production across the upper Mississippi Valley and into the Great Plains area. It marked, also, the first development of wheat farming on a truly large scale in the Sacramento Valley, the Palouse country. and the Red River Valley. It was in the Sacramento Valley that the combine was first used, and in its early development the steam traction engine was used with it as a source of power.

These developments had a profound influence on types of farming in the various parts of the small-grain region. The mere displacement of man labor by horsepower and machinery did not greatly change the farm organization so far as the human element was concerned. It eliminated the hiring of considerable seasonal labor, but did nothing to displace the family farm. It did much, however, to change the size of the operating unit; because all these inventions increased the capacity of labor. The acreage per man was greatly increased as was also the amount of capital necessary to finance a farming enterprise.

About the opening of the twentieth century the internal combustion engine began to be used on the farm, first as a source of stationary power, then in the tractor, and finally in the truck. This development did not come rapidly at first. It was only with the coming of the World War that universal attention was turned to the importance of the tractor as a source of mechanical power, and that the development of tillage and harvesting implements and machinery to fit this new source of power was seriously considered. During and after the war

there was an important development in perfecting the tractor as a mobile power unit and in developing the combined harvester-thresher. These developments again profoundly influenced the type of farming within the small-grain areas, and significantly shifted the boundaries of the territory devoted to wheat production.

New power and new machinery have again increased the capacity of the farmer in terms of land and capital and they have vastly increased his output of wheat and other small grains. More labor has been displaced, a still larger investment must be made in farm equipment, and the acreage that one man can handle has been increased.

This period has induced a great deal of discussion of the future type of business and technical organization of the farm. A few conspicuous examples of corporations being organized for agricultural production, securing vast holdings of land, and operating on exceptionally large scale, have raised seriously the question whether, with the new type of machinery, the family farm would continue to have a place, particularly in small-grain farming; and whether the corporation, with its greater command of capital and its allegedly higher degree of technical efficiency, would not become the prevailing type of business unit. Statistics lend but little support to such a supposition. There have been comparatively few instances of the promotion and subsequent operation of corporation farms in a manner sufficiently satisfactory to draw capital from other industries. Experience thus far offers inconclusive evidence; but it seems apparent that the family farm, transformed as it has already been to a considerable extent in the amount of land and necessary capital as well as in equipment and technic, will continue to remain the dominant type of farm-business organization.

Recent developments in farm machinery in the corn and livestock regions also have been conspicuous. There has been a very extensive substitution of tractors for horses as a source of power, and significant changes have taken place and are taking place in the introduction of higher-capacity planting, tilling, and harvesting machinery for corn and for the small-grain feed crops. Dependent as is this whole region on livestock as the end product and the direct source of income, it is an open question whether the wave of mechanization can ever have so important an influence upon the type of farming as it has already had in the small-grain region. To be sure, animal-husbandry practices have lent themselves to some mechanical devices that tend to eliminate or reduce labor requirements. Milking machines and cream separators have been introduced and improvements have been made in the facilities for feeding livestock and for marketing livestock products; but as yet the effect of these things in increasing the scale of operation has been generally less striking than has been the effect of machinery on crop production.

The recent drop in the prices of farm products has caused a marked slowing up in the adoption and use of farm machinery. Further development in mechanization must rest on such an improvement in the prices of agricultural commodities as will justify the considerable capital outlay necessary. The present period seems to be a repetition of recent history. The period between 1870 and 1900, as already indicated, was one of rapid agricultural development in this country. Farm machinery was not the least among the elements that stimulated this rapid development. As is always likely in such circumstances, the

development went too far and helped to bring about a depression in

agriculture.

We have usually conceived such a condition of maladjustment to be remedied by a redistribution of population and capital between agriculture and the other industries. That such a readjustment process was actually under way during the last decade is indicated by statistics on the movement of population to and from agriculture. Up to 1931, every year since 1924 witnessed a net movement out of agriculture into urban pursuits. Undoubtedly this movement was going on before 1924; but except for 1922, which showed the same movement, figures are not available. This net movement from farms averaged during the seven years, 1924-1930, about 640,500 persons annually. But, in 1930, this net movement from farms greatly declined. After allowing for deaths and births on farms, there was a net gain in farm population during 1930 for the first time in many years. This net gain amounted to 208,000 as compared with a net loss in 1929 of 269,000. Unemployment in industry is even less attractive than low returns in farming, and it seems obvious that further readjustment in our agricultural output through reduction in the number of farm families will have to await a substantial recovery in industry and trade.

This, in turn, has its inevitable effect upon the further mechanization of agriculture and the rate at which it can proceed. As long as human labor is superabundant and therefore cheap, no very rapid substitution of machinery for labor can take place. Further, the costs of employing machinery seem to have a significance different from that of costs involved in employing proprietor and family labor upon the farm. Machinery costs must, for the most part, be met with fairly immediate cash payments which must come from the gross value of the product of farm operations. On the other hand, family and farmer labor costs are not always met to their full nominal value from the product produced, and failure of the farm business to return such values does not usually result in bankruptcy nor in the immediate abandonment of

the farm.

The present situation with reference to farm mechanization and its relation to types of farming may be summarized somewhat as follows: The developments in mechanical sources of power and in implements and machinery to accompany them have, during the last 15 years, greatly increased the purely physical efficiency of human labor in the production of farm commodities. As long as favorable prices for these commodities could be secured this physical efficiency was reflected in economic efficiency and higher profits, and worked to displace considerable human labor, to increase the size of the operating unit, and to expand the output. These very developments, however, have helped to reduce the prices of commodities, and thereby to reduce the economic efficiency and hence the profits of farm operation under present conditions. It would seem that eventually not merely the present technic but one characterized by a considerably higher degree of mechanization will probably prevail. This development, however, must await very thorough-going economic adjustments, not only at home but abroad, before the prices of farm products can be such as to stimulate again a rate of growth in the use of farm machinery comparable with that which prevailed in the 10 years immediately following the World War.

> C. L. Holmes and M. R. Cooper, Bureau of Agricultural Economics.

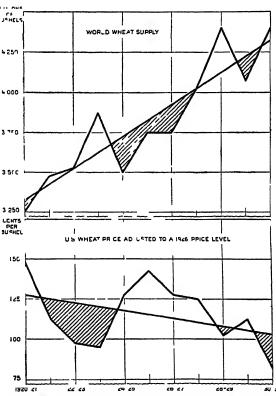
# MECHANIZATION AFFECTS BOTH SUPPLY OF AND DEMAND FOR AGRICULTURE'S PRODUCTS

Within the last decade, the marked increase in the use of large-scale farm machinery and mechanized power has had an important influence upon the agricultural price system. The general effect of this movement toward mechanization has been to increase the production per farm laborer, to lower the price per unit of farm produce, and to transfer labor from the farm to the mine, the machine shop, the trans-

portation system, and the sales force—a transfer that helped to cause the 11.5 per cent decrease in our farm population between 1920 and 1931.

The first important influence of mechanization has been to increase agricultural production. For example, the introduction of the combine and the increase in the use of the tractor in wheat production have resulted in a 65 to 85 per cent reduction in the amount of direct labor required per acre in wheat production on some of our level, semiarid land; in an increase in the cash expense per farm; and in an increase in the size of the farm unit that the individual wheat producer can handle.

This, in turn, has meant some reduction in the margin



Pigure 157—When the world wheat supply and the average furn price of wheat in the United States from 1920-21 through 1930-31 ue comp red, the supply-price relationship is quite clearly indicated. When the wheat supply has been above the trend line, prices have been below average and when the supply has been below trend, prices have been above average

between the cash expense and income per farm, provided the amount of wheat sold remained unchanged. The wheat farmer, therefore, has been inclined to increase the size of his farm in order to secure a more efficient utilization of his machine equipment and in order to increase his farm income. Large-scale wheat production by the machine method, however, has tended to be a cheaper production method than the old direct-labor method.

As a direct result, wheat production in areas suited to mechanization was quite profitable up until the 1930-31 season. Because of this, wheat acreage has tended to increase from year to year in the level, semiarid areas in the United States, Canada, Argentina, and Australia. The result, as shown in Figure 157, has been a 25 per cent increase in the

world wheat supply since 1921-22; and even though the world demand for wheat has apparently been increasing from year to year, United States wheat prices, when adjusted for changes in the general price level, still show a downward trend from 1920-21 through 1930-31.

In contrast to this first important influence of mechanization, that increases production and depresses prices, there is a second important influence that transforms the type of power used in agriculture and decreases prices by decreasing the farm demand for farm produce.

The increasing substitution of multiple-row for 1-row implements and the substitution of the tractor and the motor truck for the horse and mule have decreased the number of horses and mules required in American agriculture. This combined effect of improved machinery and mechanized power has resulted in a 29 per cent decrease in the number of horses and mules on farms in the United States between 1920 and 1931.

This decrease in the number of horses and mules in turn means an increase in the demand for raw materials and industrial labor and a decrease in the demand for pasture, hay, and grain. But just as an in-

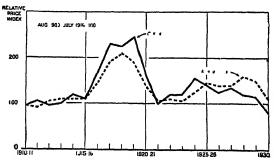


Figure 155 — Although the prices of grains rose higher during the war period than did the prices of meat annuals, the prices of the two groups of commodities tend to mose together, with meat animal prices changing from 640 is months after grain praces have the negative

creased production is accompanied by a lowcred price level, so is a decreased demand.

The third important influence of mechanization is a result of the first two. When the production of certain farm products is increased and the price is driven down, the high-cost producer is inclined to readjust by cutting acreage. Again, when

the demand for a given farm commodity is decreased and the price is driven down, the high-cost producer is forced to cut production.

Mechanization in agriculture, then, may be an important factor in concentrating the production of given commodities in the areas that possess the highest comparative advantage or are best suited to the crop under consideration. Since 1920, this process has been illustrated by the increasing concentration of hog production in the Corn Belt and of wheat in the Great Plains area.

In the case of the typical field crop, the effect of mechanization has tended to be direct. In the case of wheat, production costs have been decreased, production increased, prices decreased or prevented from increasing, and the acreage readjusted on the new cost basis. In the case of corn, both the production costs and the demand have been decreased and prices have been depressed. Again, in the case of horse and mule prices, the effect has been direct—demand has been decreased and prices have been depressed.

## Indirect Effect on Livestock Industries

In the case of meat animals and dairy and poultry products, however, the effect of mechanization has been indirect. To begin with, the

price of the farm-raised hay and feed grains is affected by mechanization. But since the feed cost is the most important cost element in livestock production, changes in the price of farm-raised feeds, as indicated in Figure 158, soon tend to be transferred in part to live-

stock prices.

We may conclude that mechanization is an important influence behind the price of certain agricultural commodities, which, through the last decade, has tended to increase production enough to offset the increase that might have been expected in the agricultural price level had agricultural production remained unchanged while the population of the United States and of the world continued to increase.

This influence, in turn, has been exerted: (1) By decreasing production costs and increasing production, (2) by decreasing the farm demand for certain agricultural commodities and thus increasing the net productive acreage, and (3) by concentrating the production of certain agricultural commodities in the regions best suited to their production and thus still further decreasing costs.

ORIS V. WELLS, Bureau of Agricultural Economics.

## MECHANIZATION HAS MADE GREATEST PROGRESS IN THE GREAT PLAINS REGION

Perhaps in no other agricultural region of the United States has there been a more fertile field for the mechanization of agriculture than in the Great Plains—that vast expanse of country extending from the Panhandles of Texas and Oklahoma to North Dakota and Montana. This region, all lying within a range of 13 degrees of longitude, is characterized by wide extremes of temperature, low rainfall, high winds, a loose loam soil, and comparatively large stretches of level land; all of which have contributed to an agriculture that has grown and thriven

on mechanical power.

At first the home of the Indian and the buffalo, then of the Texas steer which followed the Chisholm Trail, this region has been open to settlement for about half a century. Though it was first homesteaded in half-section units or less, the passing years have witnessed a consolidation of these small units until to-day single farms embracing thousands of acres are not uncommon. Varied as the sections from which came the settlers, were the horse-drawn implements that they brought with them to subdue the wild prairie sod. There followed years of experience, development, and trial before suitable equipment that would function most efficiently under Great Plains conditions was available.

During the agricultural infancy of this region changes in the methods and machines of production and in the strains of crops grown took place as the new settlers became accustomed to the peculiarities of their new surroundings. Horses and mules, before 1910, were about the only source of motive power available and the daily capacity of individual workers was dependent upon the size of these teams and the implements they pulled. With the available power and equipment at his command the agricultural worker in the winter-wheat belt of the Great Plains could handle without help, except during the peakload periods of wheat seeding and harvest, an average of about 320 acres of crop land, 200 to 220 acres of which was in wheat and the

balance in feed crops. In the spring-wheat belt the same total acreage could be handled with 160 acres in wheat, 40 in summer fallow, and the balance in feed crops.

### Horses and Mules Largely Supplanted

Rapid changes in farm power began taking place after 1910 and were augmented by the stimulus to agriculture resulting from the World War. Horses and mules were supplemented by mechanical power in the form of tractors, trucks, and automobiles. Tractor figures by States are not available for the early years. As a source of farm power, however, the tractors were relatively unimportant in 1909, the first year in which figures on the number manufactured were available. In that year 2,000 were manufactured in the United States. In 1919 the United States census reported a total of about 82,000 tractors on farms in the eight important wheat-growing States of the Great Plains Of these States, Kansas led with a total of 17,000 machines. Colo-Tractors of this decade were rado, with about 5,000, had the fewest. mostly of the large, slow-moving type, crude in construction and costly in operation. Trucks and automobiles were of little importance as a means of transportation in 1909, when about 3,000 of the former and 122,000 of the latter were manufactured. By 1919, there were about 27,000 trucks and over 500,000 automobiles on Great Plains farms. That these machines were exerting an influence on power usage is indicated by the fact that during this period, while the total number of horses and mules increased nearly 8 per cent on the farms of this region and this increase was accompanied by a 51 per cent increase in wheat acreage, there was a decrease in number per 100 crop acres of from 6.2 to 5.3 head. It was about the end of this decade that small tractors pulling 2 and 3 bottom plows were introduced, and that they were immediately popular is partly evidenced by the fact that the number of tractors manufactured in 1917 and 1918 was about 100 per cent greater than in each preceding year.

During the next 10-year period rapid mechanization took place and the number of tractors on Great Plains farms increased from about 82,000 in 1919 to 274,000 in 1929, trucks from about 27,000 to 100,000, and automobiles from about 500,000 to 1,000,000. Kansas, which led in number of tractors in 1919, was still leading in 1929 with a total of 66,000, an increase of nearly 300 per cent; whereas Colorado, still following the other States, showed about 200 per cent increase. Wheat acreages, as in the past decade, again increased and in 1929 were 15 per cent higher than in 1919. Horses and mules, however, showed a decline of approximately 13 per cent in total numbers and from 5.3 to 3.6 head

per 100 crop acres.

The increasing and widespread use of tractors and the power equipment necessary for their most efficient operation, together with trucks, has been reflected by radically changing machinery values per crop acre. For the year 1909 machinery values per crop acre for the Great Plains averaged only \$3. This value represents equipment practically all of which was horse drawn. By 1919, not only because of more machinery but because of a high general price level, values had risen to \$7, an increase of 133 per cent, on a crop acreage 26 per cent greater than that of 1909. Because of more efficient tractors and larger equipment as well as some decline in prices, 1929 values per crop acre on an

acreage 30 per cent greater averaged \$1 lower than those of 10 years previous.

### The Combined Harvester-Thresher

Expanding wheat acreages, increases in machinery values, and declines in numbers of work stock, although caused primarily by mechanical power, have been influenced to a very marked degree by power equipment. Perhaps the chief influencing factor of equipment is the combined harvester-thresher. This machine, first used in the wheatgrowing districts of the Pacific coast many years ago, is comparatively a newcomer in the Great Plains. Some 20 years ago a few machines were brought into the Judith Basin of Montana where they proved successful. One or two were carried as far south as Nebraska, but their usefulness there was short-lived. The first small combine was manufactured early in the present century, and its use and life in the Intermountain and Pacific Northwest States were also rather snort. The first small prairie-type combine, 10 to 20 feet in size with a capacity of about 30 to 50 acres per day and equipped with an auxiliary motor, was introduced into the Great Plains in 1918. This machine in the years that followed proved to be practical, efficient, and economical under most conditions in that region. From a few machines in 1918, Kansas in 1926 had an estimated total of about \$,300 combines which cut 30 per cent of the wheat crop that year. It was estimated there were about 20,000 combines on Kansas farms for the harvest of 1931. Other Great Plains States have no doubt shown proportionate increases in numbers of combines on wheat farms in view of the fact that in the period 1927 to 1930, nearly 66,000 combines were sold in the United States.

In the winter-wheat area, the disk harrow-plow with a daily capacity of 25 to 30 acres, is replacing other implements in preparing the land for planting. In the spring wheat area where summer fallowing is necessary, the duck-foot cultivator has partly eliminated plowing. Mechanical power in conjunction with these and other machines has so lowered production requirements that former submarginal lands once considered good only for grazing are now producing wheat that, under normal-prices, returns a profit on labor and materials of production.

An examination of the effects of mechanization on labor requirements shows clearly why the trend has been toward modern units of power and equipment. Investigations made in Montana, for example, indicate that where 35,000 wheat farmers were operating in 1915 to 1917, there were only 14,000 in 1929 and they in turn were handling a larger acreage. Man-labor requirements that, under the old system, amounted to from 10 to 14 hours per acre have been reduced to from 2 to 3 man-hours per acre under present conditions. Records from individual farms show that with horses it is possible for one man with some help at harvest time to handle 320 acres of crop land. With the old heavy-type tractor 700 acres per man could be handled; substituting a lighter modern 3-plow machine, 1,000 acres; and with a modern heavy-duty tractor of 30 draw-bar horsepower, 1,600 acres. Investigations made on a number of farms in Kansas show an average manlabor requirement of 6.6 hours, for producing an acre of winter wheat entirely with horses under the old methods, whereas on farms operated entirely with mechanical power and using a 20-foot combine, only 1.34 man-hours are necessary

## Production Methods Immensely Changed

It is clearly evident that mechanical power and equipment are forces that in the operator's hands have allowed hun completely to changh his methods and practices of production. In the rapidly moving picture of agricultural changes and adjustments, the effect of mechanization on the society of the community perhaps has been obscured by the stupendousness of machine production and the wonder with which it is viewed. By enabling one man to handle an acreage several times that formerly handled with horses, mechanization has led to the consolidation of farms and to a reduction in farm population as evidenced by the changes in the numbers of wheat farmers in Montana where there has been a decline of 60 per cent together with a slight increase in total crop acreage handled by those remaining, who procured the additional land through purchase from less aggressive neighbors, and by purchase or lease of abandoned or State land.

In many communities mechanization has led to what may be termed a semiabsentee-operator system of wheat farming. Under this system the operator is on the farm or in the community only long enough to put in and harvest the crop. It is the present custom of many farmers immediately after harvest to move with their families to large towns where school and social advantages are on a higher plane than in their own community or neighboring towns. Others spend the winter in the warm climates of Florida or California. It is not infrequent to find farms to which the operator comes only in the spring and fall, leaving his family in some distant town or city. Under such a system, together with a decreased farm population, many of the small prairie towns dependent on farm trade for their existence can not survive. It may be argued that they are not a necessary adjunct, for with the automobile or truck the distant large town is quickly available for immediate wants. The majority of large towns in agricultural sections, however, are just as dependent on farm trade, and they too must shrink to a size that can be maintained by a smaller rural population, part of which supports the community for only a fraction of the year.

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## CORN BELT INCREASING ITS OUTPUT PER MAN IN ALL PHASES OF CROP GROWING

The Corn Belt of the United States includes territory naturally well suited to the development of farm mechanization. This is due to the fortunate combination of gentle topography, fertile soils, and a climate favorable to a number of crops. Moreover, in this region a large proportion of the farms are over 100 acres in size. However, in so far as sections of the Corn Belt are dependent upon livestock as their end product and the direct source of income, they will never be open to mechanization to quite the same extent as are regions given over to small-grain production alone.

## Increase of Accomplishment per Man

According to studies of farm organization in the Corn Belt, the recent addition of mechanical power has raised the accomplishment per man

per day in the case of every operation studied. Thus, plowing with five horses 4.5 acres per day compares with 7 acres plowed with a

2-plow tractor and 11 acres plowed with a 3-plow unit.

Similarly, the accomplishment per man in double disking is raised from 14.5 to 21.5 and 30 acres, respectively, while plank dragging with five horses covering 20 acres per day becomes 37.5 acres when done with the tractor. In like fashion, cultipacker, harrow, and rotary hoe, each drawn by four horses and covering 16.5, 24, and 22 acres, respectively, cover 23, 43, and 31 acres when tractor drawn.

respectively, cover 23, 43, and 31 acres when tractor drawn.

Planting corn, until recently a task delegated to the fast-walking team of the farm and averaging in the above mentioned studies but 14 acres per day, was, through the use of the 4-row power planter, speeded up to 33 acres. In the cultivation of corn the use of cultivators of the 4-row type, usually tractor operated, has raised the accomplishment per man to 40 acres per day from the former 6 to 8 acres for single row and 12 to 14 acres per day for 2-row, animal-drawn implements.

Another important stride in the mechanization of corn growing is the perfecting of the mechanical corn picker. Where two hand huskers under farm conditions were reported as husking 2.8 acres per day, two men and a 1-row picker husked 6.7 acres whereas two men and a 2-row machine harvested 10 acres. In corn yielding 50 bushels per acre, this represented 70, 167.5, and 250 bushels per man per day, respectively.

The entire operation of growing corn, often consuming 15 hours of man labor per acre under the older methods, has been performed on many farms with but 7 to 8 hours of man labor when these advanced stages of mechanization are introduced. Individual instances show

even more striking differences.

### Small Grains in the Corn Belt

In like manner these recent changes in mechanization have been adopted on Corn Belt farms in the operations incident to the culture of small grains and forages. This is strikingly seen in the seeding of oats and wheat in which, depending upon the particular combination of operations employed upon different farms, from 37 to 74 per cent of the power application was supplied by the tractor. On the same farms approximately 60 per cent of the work on soybeans was done by tractor power. In harvesting and threshing oats a crew of 17 men using stationary grain separators for threshing, applied 5.6 man-hours per acre whereas with a combined harvester-thresher a crew of 3 men used but 1.3 hours. For wheat the figures were 16 men and 6.1 hours per acre compared to 3 men and 1.3 hours, respectively.

An item worthy of note in this connection is the increase in crop acres per worker between 1909 and 1929. Based upon figures taken from the Federal census the Corn Belt States reported increases in crop acres per worker of from 15 to 37 per cent; although obviously

this increase is not to be credited entirely to mechanization.

Horse and mule numbers on farms in the United States declined from 21,217,000 in 1910 to 17,611,000 in 1930, a decline of 17 per cent. For the Corn Belt States these numbers have likewise decreased, the decline from 1910 to 1930 being 22.5 per cent in Iowa and 36 per cent in Illinois. This decline is in part due to the introduction of the automobile, the truck, and the tractor, but is also due in part to other changes in farm technic aside from the introduction of mechanical

power. More significant perhaps is the accompanying decrease in the number of horses used per 100 acres of crops. In every State of the Corn Belt this figure has declined, the figure of 6.5 horses per 100 acres of crops in Iowa in 1910 becoming 4.6 in 1930, whereas for Illinois the figures are 6.8 and 4.2 respectively. Michigan with less opportunity for mechanization shows a decline from 6.6 to 4.1 and Missouri from 8.1 to 5.3.

### Change in Size of Farms

Increasing mechanization on individual farms, by reducing the demand for man labor upon a given acreage, may result in hiring less outside labor. Given a fixed labor force, or one that is reduced with difficulty, the result may be the combination of several farms into one. Usually, however, mechanization results in the addition of odd tracts of land to the area already included in the operation of the farm.

Studies in specific regions show that a lew farms have been combined and some farms have been enlarged probably as a result of the greater accomplishment per man growing out of increased mechanization. Despite this evidence, however, the trend to combine or enlarge farms is but dinly discernible in the published consus figures for the United States. This is in part due to the increase in the number of small farms near cities, offsetting the increase in the size of the larger farms. Individual States in the Corn Belt show this tendency toward largersized units with somewhat greater definiteness. When counties in the major corn-growing regions are studied in detail a tendency toward increase in the size of farms over 100 acres appears. This tendency is as yet insufficiently marked to be considered a definite trend.

Farms under 100 acres show but slight opportunity to adopt the more complete phases of mechanization. At present farms under 100 acres represent from 28 per cent of the total number of farms in Iowa to 60 per cent of the total number of farms in Michigan; this variation depending upon local conditions. Whether these small farms will be eliminated in the future is a matter of conjecture. Some of them probably will always have a place because of peculiar conditions of the local market and the nature of the land, or the particular tenure

conditions prevailing.

### Extent of Mechanization

Satisfactory data are lacking to depict for local regions the extent to which the more recently developed forms of mechanization have been adopted by American farmers. For the United States as a whole a large relative increase in tractors has taken place. As noted in a previous article, in 1909, 2,000 tractors were manufactured in the United States. For 1930, the Federal census reports 920,000 tractors on farms. Illinois alone reports almost 70,000, Iowa 66,000, Ohio 53,000, and other States smaller but still significant numbers. Similarly, tractor-drawn cultivators of which 1,698 were sold in the United States in 1925 increased to 41,577 in 1930, whereas mechanical corn pickers, of which 7,145 were sold in 1927, were reported as being sold to the number of 9,871 in 1930. The combined harvester-threshers, a number of which are being used in the grainfields of the Corn Belt, have increased from 1,590 sold in the United States in 1924 to 17,031 sold in 1930.

Despite these large relative increases in numbers there is but one tractor to each seven farms in the United States. In the Corn Belt States the numbers are larger, being one tractor to three farms in the States of maximum corn production such as Iowa and Illinois, but decreasing to one tractor to four farms in Indiana and Ohio, and to but one tractor to five farms in Michigan and one tractor to 10 farms in Missouri. Upon the number of tractor-cultivators sold in the United States from 1925 through 1930 it is estimated that an average of probably only one tractor-cultivator to 10 farms over 100 acres in size is to be found in the Corn Belt. On a similar basis there is estimated

to be one corn picker to every 10 farms over 100 acres in size.

That the advanced stages of mechanization are less applicable to small farms is demonstrated by studies of the organization of farms in a good corn-growing section of the Corn Belt. Here, farmers with less than 35 acres of corn performed with the tractor only 11 per cent of the work; those growing from 35 to 70 acres of corn used the tractor up to 35 per cent; and those growing over 70 acres of corn used the tractor up to 45 per cent. In this same section in 1929, on 116 farms, 75 per cent of the corn was husked from the standing stalks and of this amount 70 per cent was husked by hand, 27 per cent by 1-row pickers, and but 3 per cent by 2-row machines. These proportions have changed somewhat in favor of machine huskers in 1930 and 1931 and may be low for other portions of the Corn Belt, but are still effective evidence of the limited acceptance of the advanced stages of mechanization.

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## MECHANIZATION IN DAIRY REGIONS INCREASING FAST, INVESTMENT DATA SHOW

The dairy region has a comparatively short growing season and lacks the large level fields that characterize the corn and wheat regions of the United States. Hence machinery and mechanical power for field work are not used here to the extent that they are used in the other regions. On the other hand, milk is a bulky product, and on a large proportion of the farms it must be hauled daily. This has led to a greater use of trucks than of tractors on dairy farms. Thus the State of New York, according to the 1930 census, had 37 trucks and 25 tractors per 100 farms, whereas Illinois had 19 trucks and 32 tractors per 100 farms.

The work of caring for the dairy herd requires more than 50 per cent of the total farm labor on the specialized dairy farms in the northeastern United States. Approximately one-half of the work on the dairy herd is taken up in milking where hand milking is practiced. This one operation under hand milking usually limits to 10 or 12 the number of cows that can be kept per worker. Few dairy farms reach the upper limit in numbers of cows to be milked per person with a milking machine. Cases of one man milking 30 cows or two men

milking 60 cows are not unusual.

The number of milking machines on farms is not recorded in the census of agriculture but an indication of their numbers on dairy farms can be obtained from various farms surveys that have been made.

In the spring of 1930 the New Hampshire College of Agriculture made a survey of 414 farms in Grafton County. Ninety-six of these farms had milking machines. A year later a survey made in Coos County showed that 42 dairy farms out of 83 had milking machines. In Connecticut the extension service obtained reports from 863 dairy farms of which 298 had milking machines. A survey of 318 farms in northeastern New Jersey in the winter of 1930-31 showed milking machines on 75. In southeastern Pennsylvania (Chester County) a survey of 204 farms in the summer of 1931 showed 21 owning milking machines.

The total investment in farm machinery per farm in the New England States increased 173 per cent from 1910 to 1930. In Wisconsin the increase amounted to 213 per cent per farm for the same period. Part of this increase was due to a rise of about 50 per cent in the price level. Mainly, however, the increase was due to the addition of trucks, tractors, automobiles, and milking machines on many farms, and to a less extent to the addition of new field machinery such

as side-delivery rakes, hay loaders, corn binders, etc.

### Changes Partly Attributable to Mechanization

The changes that have taken place in the dairy region during the last 20 years have been due in part to mechanization. The available measures of changes in size, efficiency, and productiveness do not measure the effect of any one factor alone, but rather are the result of a number of factors. Thus the number of dairy cows per farm in the New England States in 1930 was 26 per cent above the number per farm in 1910, and the milk production per farm for 1929 was 57 per cent above the production in 1909. It seems reasonable to assume that a part of the increase in numbers of cows during this period was due to better barn equipment and to milking machines. But the increase in milk production per farm over and above that due to the increase in numbers of cows was more likely due to better cows, and to better feeding and care of them.

Definite information on the saving of labor per cow associated with the use of milking machines was obtained in the Grafton County, N. H., survey in 1930 previously referred to. During the year the 96 farms with milking machines spent 130 hours of man labor per cow or three-fourths as much time as was spent per cow on the 230 farms that did not have milking machines. The former group had 22.8 cows per farm compared with 14.8 in the latter group.

Similar results were obtained in a survey made in the summer of 1931 covering parts of the New England States and Wisconsin. The 26 farms with milking machines used 71 per cent as much man labor per cow as did the 41 farms that did not use milking machines. average number of cows per herd were 26 and 17.7, respectively.

This difference in size of herds would account for some of the difference in the labor required per cow. On the other hand many of the farms using milking machines have not yet adjusted the size of their herds and other factors to the new equipment so as to attain the same relative efficiency that is attained on the farms where milking is still done by hand.

Another measure that gives some indication of the effect of mechanization is the number of crop acres per farm worker. From 1909 to 1929 the number of crop acres per farm worker increased in nearly all of the dairy States. In Vermont the increase was from 26 crop acres per worker in 1909 to 30 crop acres per worker in 1929. For New York the comparable figures were 25 and 31, and for Wisconsin 31 and 36

### Labor Efficiency Study in Connecticut

A study of labor efficiency in Connecticut reported in Connecticut Agriculture Experiment Station Bulletin 172, corroborates the assumption that some of these increases were due to mechanization. Detailed records of the man labor used in haying on 115 farms showed that the 17 farms using hay loaders spent 0.65 hour less man labor per ton of hay than the farms that had no hay loaders.

A test was made of silo filling on 3 farms on which corn binders, low racks, a medium-sized cutter, plenty of power, and a well-organized crew were used in comparison with the average of 40 farms that lacked some of these essentials. These 3 farms filled their silos with 40 per cent of the man labor per ton that was used on the average of the 40 farms. Approximately the same results are reported in an

earlier study in New Hampshire.

As yet mechanical refrigerators for cooling milk are seldom found on the farms, but cleaner milking, the use of more sanitary barn equipment, more ice in cooling, covered cans, tank trucks or tank cars for hauling, good roads, pasteurization and cooling at the city plants, and prompt delivery to the consumers have brought about a steady improvement in the quality of milk. Consumers have increased the quantities used per person even when the price as compared with that of other foods was increasing. Similar improvements have been made in methods and equipment for producing, handling, and transporting other dairy products. Thus we see that from the production of feed on the farm to the delivery of dairy products to the consumer, mechanization has become increasingly important.

Within the general dairy region are small areas that specialize in the production of potatoes, truck crops, and fruits. On some of the potato farms mechanization has gone practically as far as on the specialized wheat farms in the West. In Middlesex and Monmouth Counties, N. J., more than 30 potato farms, within the last two years, have done practically all of their field work with general-purpose tractors, and their hauling with trucks. Vegetables and fruits are still harvested mostly by hand but tillage operations are being performed more and more by large tractor-drawn implements. A study is now being conducted in the potato and truck areas of New Jersey to determine the conditions under which increased mechanization is profitable.

In the preparation of fruits and vegetables for the market, various homemade devices are used on the small and medium sized farms to lessen hand labor. Studies in Massachusetts of the time required in preparing vegetables for market indicate that some of these homemade devices are highly efficient. Large farms and cooperative packing plants use more elaborate and more standardized equipment.

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# MACHINERY IS THE BEST MEANS YET FOUND FOR CONTROLLING CORN BORER

At the present time, control of the European coin borer is best accomplished through the use of machinery, however, because of cer-



Figure 159 -Two-bottom plow with attichments for clean plowing-large rolling collers, jointers, and transmission

tain habits of the borer it can not as yet be successfully combated in the growing crop, but must be attacked during or after harvest. For the application of mechanical control two general field conditions have to be met: (1) Disposal in the field of the standing stalks from which the corn has been

hand or machine picked, and (2) removal of the whole stalks, with the contained borers, from the field for later disposal—as in silage or by mechanical husking and shredding.

On probably 80 per cent of the corn acreage in the Corn Belt States the corn is picked from the standing stalks. Of this area approximately one-half is plowed and the balance ordinarily is disked down and then seeded to small grain, or it is poled, raked, and burned pre-

paratory to being seeded to small grain.

To effectively control the corn borer the plowing must be done in such a way that all stalks and crop refuse are completely covered to a depth of 6 to 8 inches so that subsequent seeding and tillage operations or weathering will cause little, if any, of the buried trash to reappear. Because of this elimination of their shelter, the borers coming

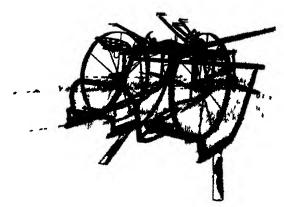


FIGURE 160 —Stalk-shaving attachment on single row cultivator, idepted for cutting three rows at one time

to the surface die from exposure or from attacks of natural enemies.

## Adjustment for Clean Plowing

To plow clean the implement must be properly hitched and adjusted so that it runs level, making furrows of uniform depths and widths. By the use of special attachments such as trash wires, large colters and jointers, clean coverage is greatly facilitated. Figure 159 shows a plow fitted with special attachments. Fourteen-inch plows give fair coverage, but 16 and 18 inch, in most cases, give better coverage. It has been found that careless adjustment has a greater relative effect on the performance of a small plow than on that of a large plow.

Where the stalk fields are to be seeded to small grain the treatment of the crop débris for borer destruction is important. Disking only, before seeding, results in killing only a negligible percentage of the borers. By the ordinary processes of poling, raking, and burning, not enough borers are destroyed to effectively control the pest. Field tests have indicated that for satisfactory poling a temperature below 20° F., high moisture content of stalk, and freedom from snow are essential. Observations at Toledo, Ohio, extending over four years, showed these conditions existed on only one or two days each winter. Even under the best conditions all stalks were not severed and clean

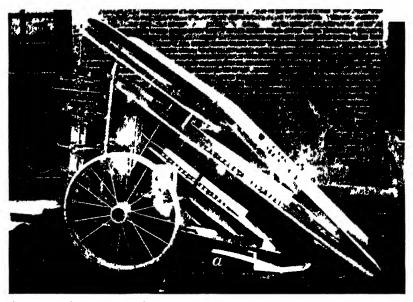


Fig. 1.61—Low cutting at ichment on coin binder. With the curved stationary knife (a) for cutting the stalks at ground surface, it is necessity to use also a sickle guard and special springs and guides to hold the stalks.

raking was difficult if not impossible. Moreover, the stalks were considerably shattered and the borers thereby scattered about.

By the use of a 2-row sled stalk shaver or a single-row cultivator with a 3-row stalk shaving attachment (fig 160), practically all stalks may be detached flush with the ground surface. With two sled shavers abreast, four rows may be cut at one time. The attachment for cutting three rows has been adapted to six of the commonly used single-row cultivators. For cutting four rows, a 4-row attachment has been made for two common makes of 2-row cultivators. Attachments for 3 and 4 row cultivators are in process of development.

### Clean Raking Necessary

After the stalks are detached, clean raking in piles or windrows is necessary. This is best accomplished by the special 4-bar side rake, although the dump rake followed by the ordinary hay side rake will

do a fairly satisfactory job. Burning then follows, during which operation care should be taken that all stalks and bits of débris are

consumed by the flames.

In harvesting, if the stalks are cut flush with the ground surface, most of the borers may be removed from the field in the stalks. The ordinary corn binder leaves stubble at least 5 inches long. By the use of a binder equipped with the stationary-knife, low-cutting attachment, the stalks may be cut at the ground surface. (Fig. 161.) For surface cutting by hand a special corn-harvesting hoe may be used.

After the corn is removed from the field, careful ensiling results in practically complete borer destruction, as does also mechanical husking and shredding. Borers which escape the knives of the silage cutter perish in the silo. Those that are not killed in the husker-shredder

die from exposure or from being trampled in the yard.

The foregoing applies particularly to the 1-generation area, or north-central infestation. With some modifications, chiefly as to plowing and the low-cutting of the corn, the measures are applicable to the 2-generation or New England infestation.

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# MECHANIZATION IN SOUTH HAS BEEN RETARDED BY LACK OF A COTTON-PICKING MACHINE

Below the Mason and Dixon line, in the old Cotton Belt, the use of mechanical power and equipment has lagged, when compared with its use in other farming regions. This is not because the southern planter is more conservative, more satisfied to carry on after the fashion of his fathers, less progressive than his neighbor in the newer cotton regions of Texas and Oklahoma, or less eager for efficient methods of production, than are farmers in the Wheat and Corn Belts; but because of peculiar circumstances that have, at any rate until now, generally counterbalanced much of the effectiveness of the larger

units of machinery.

Where farm machinery has proved its economic value in the South it has been adopted rapidly and generally. Thus in the Cotton Belt of western Texas and Oklahoma, where itinerant labor is available for chopping and picking, and where the size of farm and the topography are generally well suited to the use of large machines, mechanization to a considerable degree has been adopted for handling cotton, grain sorghums, truck, and small grains, which are the principal crops grown. A survey of the rice area of Arkansas shows that there is not a single rice farm without tractor power. Even the most highly mechanized sections of the Wheat Belt are not generally so completely stocked with machine power.

In contrast to the general use of power machinery by rice growers, the cane growers of Louisiana have been cautious about replacing their mules with tractors. Of 74 cane farms studied in 1929 only 8 were using tractor power. Others contemplated the use of tractors for the 1930 season. The cotton farmers in the hill sections of the South make a still smaller use of mechanical power and even in the

Delta sections the mule remains the prime source of power.

#### Factors Resistant to Mechanization

A number of factors contribute to this resistance to mechanization in much of the "Old South." The cropper system of tenure is based upon small farming units, and can operate only with them. So long as cotton is chopped and picked by hand, there is no advantage in conserving labor for other operations since the workers must be retained throughout the year so that they will be on hand for these very important and seasonal duties. To this difficulty is added the handicap in the shortage of available labor now trained in the use of mechanical devices. Over a great part of the Old South the farms are too small to warrant a heavy investment in mechanical equipment. Especially on the hill farms the fields are small and irregular in shape with a soil and topography that make terracing necessary to prevent erosion. In the wooded sections stumps in the fields often hinder the use of any except small mule-drawn implements.

Cotton, corn, rice, sugarcane, peaches, tobacco, and grain in various combinations make up a diversity of crops in the Southern States. Although tractors were in general use throughout other agricultural regions in this type of production, their adoption in the South was slow and it was not until a general-purpose tractor with specialized equipment was available that any real progress in mechanization in

fruit and truck culture did take place.

Under conditions that have long existed, with mules as the only available source of motive power, the hill-section operator and his family can handle 25 to 40 acres of crops, and the plantation-cropper family about 15 acres of cotton plus a few acres of feed crops, whereas the west Texas operator alone, with larger equipment, takes care of 100 acres of crops, except during harvest. Although figures by States are not available, it is hardly probable that mechanical power in the form of tractors, trucks, and automobiles was an important factor in most of the South before the World War, or until the small tractor, pulling 2 and 3 bottom plows, was introduced about 1918. In 1919, the first year in which tractors were reported by the United States census, there were about 29,000 tractors on farms in the 10 cotton States as compared with more then 246,000 on all farms in the country. Of the total number in the Cotton Belt, about 9,000, or 31 per cent, were in Texas. Many of these were on farms that produced small grains, primarily wheat. During this same year, Mississippi could muster a total of only about 600; whereas the Corn Belt State of Illinois had 23,000 tractors on farms and the wheat State of Kansas had 17,000,

#### Trucks and Autos in South

As the acreage of cotton that can be handled by one man is limited by the amount that he can chop and pick, the tractor of that period did not materially affect the cotton acreage handled per man. But, acreages of other crops handled per worker no doubt showed a slight increase. Trucks and automobiles were also of relatively little importance at that time and by 1919 there were in 10 Southern States only about 21,000 of the former and 367,000 of the latter, with Texas again leading in both, and Louisiana having the fewest. During the decade from 1909 to 1919 there was an increase of over 9 per cent in the total number of mules in the 10 States. There was, however, a 19 per cent

increase in crop acreage, which resulted in a decrease in mules per 100 crop acres from 6.8 to 6.3 head, indicating that mechanical motive power was beginning to exert some influence on southern agriculture.

From 1919 relatively rapid strides were made in mechanization in the cotton States as a whole, and by 1924 the number of tractors had increased from about 29,000 to 59,000; trucks from about 21,000 to 57,000; and automobiles from about 367,000 to 664,000. During the 5-year period, 1924 to 1929, tractors again increased markedly. increase was due to several causes, chief of which was the introduction of the general-purpose tractor, together with planting and cultivating equipment. In 1929, according to the United States census, there were about 112,000 tractors, an increase of about 290 per cent in 10 years; trucks numbered 177,000, an increase of about 740 per cent; and automobiles 1,068,000, an increase of 190 per cent. In number of tractors, Texas again led. Mississippi, however, led on a percentage basis with an increase of about 730 per cent, whereas Louisiana had the lowest percentage increase. By 1929, Texus also led in total numbers of trucks and automobiles, with South Carolina having the fewest trucks and Louisiana the smallest number of automobiles. sissippi showed the greatest percentage gain in trucks and automobiles from 1919 to 1929, with an increase of about 1,540 per cent for the former and 440 per cent for the latter. As in the preceding decade, crop acreage in the 10 States increased, and in 1929 was about 15 per cent higher than in 1919. Mules during the same period showed a decline of nearly 8 per cent in total numbers, or from 6.3 to 5.1 head per 100 crop acres.

### Multiple-Row Planters and Cultivators

In the early period of tractor usage, plows, listers, and disk harrows were about the only implements used for drawbar operations. With the development of the general-purpose tractor came the 2-row lister, and 2-row and 4-row planters and cultivators. The combine harvester-thresher, which has revolutionized harvesting and threshing operations in the Great Plains, has also invaded the Cotton Belt States. Figures showing the numbers of combines by States are not available, but it is known that as early as 1925 one combine was purchased and used in Mississippi. A study made in South Carolina in 1931 included 36 grain combines, 20 of which were bought that year. Georgia also has a considerable number, and one plantation in North Carolina had 5 combines in 1928.

With the increasing use of tractors, power equipment, trucks, and other machines, values of machinery per crop acre have changed materially. For the years 1899 and 1909, when all equipment was mule drawn, values amounted to only \$2 and \$3 per crop acre, respectively. By 1919, due not only to more machinery but to a high general price level, values had risen to \$6, an increase of 100 per cent over 1909, on a crop acreage 19 per cent greater. With more efficient tractors and equipment, with some decline in prices, and with an acreage 15 per cent greater than in 1919, values per crop acre in 1929 averaged \$1 lower than those of 1919.

While mechanical power in the South has been affecting numbers of mules, total acres in crops, and machinery values per acre, there has also been a noticeable effect on the capacity of individual workers. Comparisons between 1909 and 1929 show that in North Carolina the

acreage handled per worker increased from 13 to 16 acres; in South Carolina from 16 to 20; in Georgia, from 19 to 25; in Alabama, from 17 to 21; in Tennessee, from 16 to 22; in Mississippi, from 14 to 18; in Louisiana, from 15 to 19; and in Arkansas, from 16 to 23. In Oklahoma and Texas, where wheat as well as cotton is an important crop, acreage increases per worker between 1909 and 1929 were from 38 to 59 for the former State and from 25 to 46 for the latter. For the entire Cotton Belt the average crop acreage per worker increased from 19 to 28 acres, or 47 per cent.

In the Mississippi Delta cotton produced with mules required an average of 128 hours of man labor and 39.3 hours of mule work per acre, while that produced with tractors and some mule work required 90.8 hours of man labor, 5.5 hours of tractor and 5.3 hours of mule

 $\mathbf{w}$ ork.

### Mechanization Prospects in Cotton Belt

What is in store in the way of more efficient and widespread utilization of mechanical power in the Cotton Belt? Eli Whitney's invention of the cotton gin was to the cotton planter what the invention of the threshing machine was to the grain grower; but the grain binder or combine harvester-thresher has no counterpart in cotton-harvesting machines and this one fact alone affects the entire future structure of mechanization for the production of cotton. As previously stated, the acreage of cotton that one man can handle is usually limited to the amount that he can chop and pick. By using a hill-drop planter, hand chopping and hoeing can be largely eliminated, but the picking is still to be done by hand; so the situation in much of the cotton country remains static. Without a successful cotton-picking machine. the planters in many sections are faced with the necessity of maintaining throughout the year a labor force sufficient to pick the crop, and extensive mechanization would result in piling up many idle hours for the croppers waiting for harvest time. The sugarcane planter finds himself in much the same position as the cotton grower. Planting and harvesting are still done by hand because of a lack of suitable equipment.

At present there are a number of cotton-picking machines which, according to unbiased observers, are nearing the stage of development bordering on success. In the last few years there have been developed machines for planting and harvesting cane which, according to reports, have possibilities of success. The next few years should witness the success or failure of the cotton and cane machines; and if they are successful there may be in many sections a concerted rush toward mechanization just as pronounced as that which has occurred

on the wheat farms of the Great Plains.

L. A. REYNOLDSON and B. H. THIBODEAUX, Bureau of Agricultural Economics.

# COTTON QUALITY AFFECTED IN GINNING PROCESS BY MOISTURE IN SEED COTTON

Each season the problems encountered by growers and ginners in handling and ginning cotton seem to increase. There appears to be no single factor, however, so important to the ginning of cotton and to its resultant quality as the moisture content of the raw seed cotton. It is commonly known, for instance, that where cotton of inferior preparation occurs it frequently is due to the ginning of seed cotton that has not been properly conditioned; that is, material which is early or so-called green-sappy, on the one hand, or late, dew-laden,

or rain soaked, on the other.

When the cotton crop receives excessive rain during the growing season, heavy foliage and rank stalks prevent the maturing bolls from being sufficiently exposed to sunlight. Consequently, the bolls open more slowly, and the seed cotton possesses a high percentage of moisture, making it very heavy. It has been the general practice for growers to harvest and gin such seed cottons in this condition. In recent years, however, with prices declining, the growers have realized more than ever the need for rapid and adequate conditioning of their seed cotton before it is ginned. Some growers have renewed the old custom of sun drying and of storing their cotton in small cotton houses or cabin galleries for several days before ginning. Such practices, although possessing merit, are sometimes rather costly and cumbersome, and are hampered by unfavorable weather conditions.

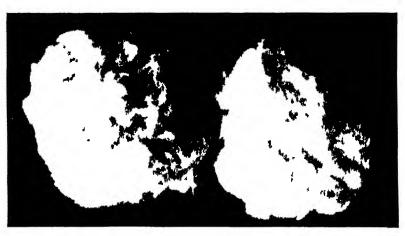


Fig. 1 RL 162—"samples of lint from the same seed cotton, ginned by the sumeme thod, conditioned to two ways. Sample (left) from ginning green and damp early seed cotton without drying; sample (right) from ginning same cotton after drying in Government drie. Note the improvement in preparation of the sample caused by drying the seed cotton before ginning

#### Artificial Cotton Driers

The development and use of artificial cotton driers during the last few years, particularly in 1931, have afforded a practical and economical means of successfully drying seed cotton. Dependable units in both homemade and factory-built designs have been developed by the Bureau of Agricultural Engineering and by several commercial concerns, with the result that growers and ginners now have a wide range of choice in drying equipment.

A striking example of the variation in preparation, one phase of cotton quality, is illustrated in Figure 162. The two effects here shown resulted from ginning two samples of the same seed cotton adjusted to two different conditions of moisture. The sample shown on the left illustrates what is known as rough preparation, which results from ginning the seed cotton in a so-called green and damp

state. This cotton is undesirable for spinning. The sample shown on the right illustrates a very smooth and desirable preparation, obtained from ginning the seed cotton after it had been conditioned in a drier at the department's experimental ginning plant at Stoneville, Miss.

The two samples illustrated in Figure 162 have been classed according to commercial trade practices and quality descriptions as follows: The sample on the left, Strict Middling grade, 1%-inch staple length, C preparation, neppy, irregular, stringy, and wasty; the one on the right, Strict Middling grade, 1%-inch staple length, B preparation, and only slightly neppy.

### Good Effects of Drying Operation

In addition to the visible effects on the quality of the ginned lint, other beneficial effects were observed during the ginning of the two cottons. The seed from the artificially dried seed cotton were more completely cleaned than those from the damp seed cotton, and a better moting action was obtained with the former than with the latter. Ginning seed cotton with proper moisture content, therefore, appears not only to produce a product of better preparation, and frequently of better grade, but to eliminate many of the mechanical difficulties that

arise in attempting to handle and gin damp seed cotton.

Additional laboratory analyses are being made on the various samples of seed cotton, ginned lint, linters, and seed that are coming from the department's experimental ginning plant. These samples represent the ginning of seed cotton of a wide range of qualities and of varying moisture content. They represent, also, varied mechanical organizations at the gin. The data are being accumulated and subjected to statistical analyses, which are expected to provide conclusions as to the optimum moisture content at which to gin each major type of seed cotton, with the range of mechanical organizations found in ginning equipment now in use or which will be developed in the future.

With the development and installation of driers, it seems highly probable that more efficient and successful ginning will result, and that

it will be done more easily and economically than heretofore.

F. L. Gerdes, Bureau of Agricultural Economics.

# SEED-COTTON DRYING PROVES PROFITABLE; TWO TYPES OF DRIERS USED

It has become a rather general practice for cotton planters to bring or send their seed cotton to the gins as soon as it is picked, regardless of the amount of moisture it may contain. This is due, in part, to improved roads and transportation facilities and to the fact that many of the plantations are no longer equipped with facilities for storing the whole crop or for drying it naturally. Consequently much of the early and so-called green cotton received at the gin is sappy, and much of the late cotton is rain soaked or dew laden, or both.

A series of investigations intended to develop simple and practical means for artificially drying damp seed cotton, in order to make ginning easier, simpler, and more economical and to improve the quality of the lint, has been carried on since 1926 by the Bureau of Agricultural Engineering. As a result of these investigations a definite process has

been developed, now somewhat generally known as the Government process, which meets the special requirements for drying seed cotton and is adaptable to various types of cotton-drying equipment. In this process the damp seed cotton is subjected to a continuous current of hot air for from 45 seconds to 3 minutes, the temperature of the blast being held between the working limits of 160° and 200° F. and the amount of air between 40 and 100 cubic feet per pound of damp seed cotton. For the early green-sappy cottons, the lower temperatures of 160° to 175° seem most satisfactory, while the higher temperatures of 175° to 200° are generally used on late, rain-soaked cottons. Temperatures above 200° especially for the early cottons, appear likely to damage the cotton fiber. Therefore, until more information has been obtained from the studies under way or proposed, higher temperatures than 200° are not recommended.

From 1927 to 1930 the drying process was used in various designs of equipment, and two types of driers have been developed. In the first

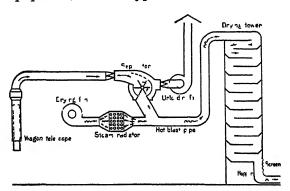


FIGURE 163 - Dingrim of vertical seed-cotton drier installation

type, the seed cotton was dragged and rolled along four or six floors in a horizontal drying cabinet. In the later type the horizontal cabinet and conveyor chains are replaced by a vertical drying tower with no moving parts. These driers can be operated successfully in any kind of weather. if the dried cotton is conveyed immediately to the gin in the

heated air. Extremely wet cotton is handled in the horizontal drier by reducing the speed at which the cotton is carried through the cabinet and in the vertical drier by passing it through the tower a second time.

The vertical-drier installation comprises an unloading fan, a separator, a drying fan, steam boiler and radiator for heating the drying air, and the drying tower. (Fig. 163.) The seed cotton from the wagon telescope passes through the separator and into the blast of heated air, which carries it into the top of the tower. As the cotton is tumbled and rolled down over the 13 to 15 staggered floors in the tower, the excess moisture is evaporated. The blast carries away this moisture, together with considerable trash and dirt from the dried cotton, through the screens in the side of the hopper at the bottom of the tower. From this hopper the cotton is drawn by the regular suction of the gin.

The vertical drier is of simple construction and may be homemade in sizes having sufficient capacity to supply a 5-stand cotton gin. The space required is not too great to permit installing the drier in connection with the standard widths and heights of cotton gins. The drying tower may be built outside the gin building. (Fig. 164.) The power requirements are approximately 30 horsepower of steam at from 50 to 100 pounds pressure for heating the air, and about 30 belt horsepower from motors, engine, or tractor for operating the fans and separator. As the drying tower and all the auxiliary features are dependable and

simple, such a drier can be built cheaply and will have a long life with little attention.

The cost of artificial drying has ranged, as far as the department's engineers have observed the practical operation of such equipment, from 40 to 90 cents per bale, and the net increase in value of the cotton has ranged from 60 cents to as high as \$5 or more per bale. Over 1,600 bales of damp seed cotton was commercially dried by one vertical drier in the 1931 season, and other gins reported having handled hundreds of bales each. A commercial 5-80 cotton gin, operating on long-staple cotton, reported that it has been successfully supplied

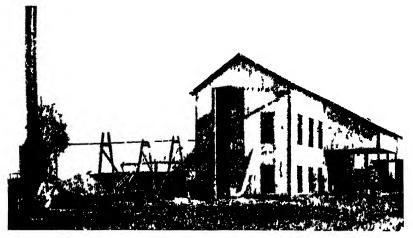


FIGURE 164 - Tower of vertical seed-cotton drier erected outside of gin building

with dry cotton from its homemade vertical drier, and that the capacity of the gin has also been increased about one bale per hour during the 1931 season.

CHARLES A. BENNETT, Bureau of Agricultural Engineering.

# REMEDIABLE PHYSICAL CONDITION OF FARM OFTEN HAMPERS USE OF MACHINES

In order that crops may be grown at a minimum expense, the mechanical equipment used in seeding, cultivating, and harvesting must be adapted to the particular farm on which it is used and must be efficiently operated. Each farm presents a separate and distinct problem wherein the proper relations between kind and amount of

crop, livestock, and machinery must be determined.

The physical condition of the fields where the machinery is to operate must be taken into consideration when determining the type and size of machinery which will fit into a balanced farm program. The ideal condition for the economical operation of any field machine is a large, level field, free of all obstructions. While even the simplest machines can do their best work in such a field, sufficient data are available to establish that under such conditions the larger machines generally are more efficient than small ones. But as the size and regularity of the field decrease, and as the number of obstructions

increases, the size of the equipment that can be operated efficiently

decreases until, at last, only 1-horse machinery is usable.

Except in certain sections of the West, it is probable that small, irregular fields are the rule rather than the exception. Recent surveys made by the Department of Agriculture show that on 11 typical farms in central North Carolina the average size of the fields is 3.7 acres; on 20 farms in as many counties in Georgia the average size of the fields is 5.6 acres; and on 11 farms in 6 counties in southeastern Minnesota the average size is 12 2 acres. The principal reasons for the smallness and irregularity of these fields are poor drainage, meandering creeks, open ditches, gullies, terraces, hedges, straggling and uneven timber, and steep hillsides.

The farmer should look over his land and see what changes and improvements can be made to better adapt it for machine operations. If there are large bowlders or stumps or small patches of timber obstructing farming operations they should be removed; wet spots should be drained and gullies should be filled and reclaimed. Such improvements add to the tillable acreage and lower the cost of opera-

tion of farm machines.

The kind and capacity of the machinery to be used should be taken into consideration in laying out the farming program, since the capacity of the equipment may be the controlling factor in fixing the acreage of the various crops. To some extent, the state of development of the machinery will determine what crops may be produced at a reasonable cost, since for some crops machinery has been developed for large-scale production through planting, cultivating, and harvesting, while for other crops only seeding, or seeding and cultivation, can be done by large machines.

## Many Other Factors to Consider

On farms where a diversity of crops is practiced, many factors other than machinery must be considered in planning the cropping program. Often, these other factors are of sufficient importance to determine the crop rotations and the sizes of the fields, and in such cases the machinery used must conform to the cropping program. It is not always advisable to use the largest machinery units, even though their operation costs per acre may be lower than those of smaller machines. It is desirable to keep the original investment in machinery at the lowest reasonable figure. The overhead and depreciation costs of farm machinery are high because much of the machinery is used only a few days each year. The overhead charges may be reduced by so planning the cropping program as to give maximum employment to each piece of machinery and to avoid investment in unnecessary equipment.

In order than any machine may do its best toward reducing the costs of crop production, it must be efficiently operated. Not only must the field be of proper size, shape, and condition, but the machine must be handled with the idea of securing from it a maximum amount of work at reasonable cost. For instance, a tractor should be equipped with enough tools so that every time it crosses a field it will be doing the economical maximum amount of work. Note that it is the "economical maximum" and not the "absolute maximum" which is desirable, since it is possible to make the load too heavy for good operation. In harrowing, it is generally better to keep the width of the harrow to that which can be pulled by the tractor in high gear rather than to

increase the harrow width until low gear must be used. In cultivating row crops, as the load is increased by increasing the number of rows, there is a loss of flexibility in operation which may be very expensive in the long run. Economical operation of farm machinery is to be obtained only by determining the proper relation between amount and kind of work, the conditions under which the work must be done, and the amount and character of the equipment used.

A great aid in the efficient operation of farm machines is familiarity with their construction and operation, so that ordinary troubles can readily be located and remedied. This minimizes costly delays in rush seasons. Finally, the machines should be carefully housed when not in use and the parts likely to rust should be thoroughly greased. At the end of the season they should be thoroughly inspected and notes made of any repair parts needed so that repairs can be made during the off season.

George R. Boyd, Bureau of Agricultural Engineering.

# TRACTOR'S ADAPTATION TO VARIED FARM OPERATIONS RAPID IN RECENT YEARS

Progress in the development of agricultural power and machinery during the last 25 years has been so great that to-day it is possible to operate a farm entirely without the use of animal power. Whereas formerly, plowing one furrow required the services of a man and a team of horses, to-day the same man may command a power unit capable of plowing several furrows at a time, and at faster speeds, without slowing down in hot weather and without the labor involved in caring for horses.

The first tractors were mainly adaptations of the stationary steam engine. They were cumbersome, and because of their ponderous weight they were ruinous to the soil and the ensuing crops. They were dangerous if in incompetent hands, and required constant attention. Hauling water and coal to supply the larger steam tractors, which could plow 8 and 10 furrows at a time, kept two teams and

drivers busy continuously while the tractor was operating.

The first internal-combustion engine was made more than a century and a half ago, but it was not until 1876 that the Otto engine appeared. This was the first of the 4-stroke-cycle type, involving the principle upon which is built the internal-combustion engine of to-day. The intensive research and experimental work fostered by the rapid development of the automobile has contributed no small part to the

refinements now found in gasoline tractor engine designs.

The first gasoline tractor, like the first steam tractor, was practically a stationary engine mounted on a frame supported on wheels and equipped with some sort of driving mechanism. The advantage of this mobile power plant over the steam tractor was soon recognized. However, there were yet many problems to be solved before the gasoline tractor would be practicable for general use on the farm. And these problems related not only to the mechanical details of mobility, cost, efficiency, and dependability but also to the development of adequate and economical supplies of liquid fuels.

Twenty-five years ago the gasoline tractor was large and cumbersome. The bore ranged from 8 to 10 inches, and the stroke around 15

inches. The engine speed was low, about 200 to 250 revolutions per minute. The so-called make-and-break ignition and the constant-level or overflow type of carburetor or mixer were most generally used. The road and plowing speed rarely exceeded 2 miles per hour. Three or four furrows were plowed at one time.

### Demand For Larger Power Units

The great Northwest was opening up at this time, with millions of acres to be put under plow. Consequently the demand was for larger power units. About 1909 2-cylinder tractors came into being. Four-cylinder tractors also appeared, which developed up to 80 horsepower and were capable of pulling 10 and 12 plow bottoms, but weighed as much as 25,000 pounds. A veritable road roller on the land! The bore of the cylinders was decreased and the engine speed was slightly increased, but the plowing speed was changed very little.

Toward 1912 the need of smaller power units became evident. The large, ponderous traction engines were not generally suitable for farm uses Lower-powered, lighter-weight tractors with higher engine

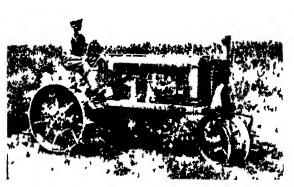


FIGURE 165 -General-purpose of row-crop tractor of common type

speeds appeared, having one and two cylinders, and in some instances with two road speeds. These would operate under more adverse conditions and in smaller fields. Moreover, they cost less than their heavy predecessors, and the smaller repair parts also costless and were easier to install.

Four-cylinder tractors with vertical enginesrunning at 1,000

revolutions perminute appeared in 1914, light in weight and having three forward speeds. At this increased engine speed the make-and-break ignition system proved to be inadequate, because of inertia effects of the moving parts and because of the effect on timing resulting from wear of the many parts that compose this system. The perfection of the high-tension ignition system overcame the difficulty. Better and more positive carburction was likewise needed at this increased engine speed, hence the development of the float-feed carburctor principle in general use to-day. The World War accelerated the development of this type of tractor, because of the scarcity of man power, and 1-man outfits were put on the market. Two-cylinder tractors of lightweight construction also made their appearance.

## The General-Purpose Machine

Since then the principal effort has been to adapt the tractor to performing all farm operations. It is worthy of note that a 30-horsepower tractor of to-day weighs approximately 3 tons, probably less than half as much as a tractor of equal power 20 years ago.

The power take-off was brought out in 1922. With that device, machines can be operated directly from the tractor and thereby relieved from dependence upon the ground-wheel drive. Previously, power was delivered by the tractor only at the belt pulley and at the draw bar.

The first general-purpose or row-crop tractor appeared about 1924, suitable in weight, power, and maneuverability for working on plowed ground, between crop rows, and in small fields. (Fig. 165.) Complete motorization of the farm was then possible. The expense of purchase, operation, and upkeep was sufficiently low to make the use of this tractor practicable on farms of moderate size.

The conventional general-purpose tractor is powered either by a 2-cylinder horizontal or a 4-cylinder vertical engine, mounted on a high-clearance chassis, with one or with two closely spaced guiding wheels in front and two driving wheels wide apart at the rear. The front wheels run between adjacent rows and the rear wheels straddle one or more rows. Because of the different row spacings required for different

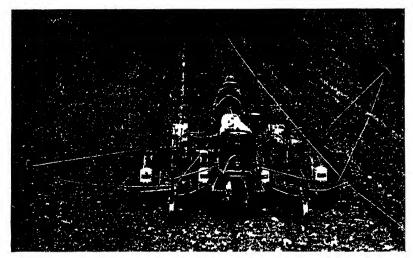


Figure 166 —General-purpose tractor with attachments, check-rowing four rows of coin at one time

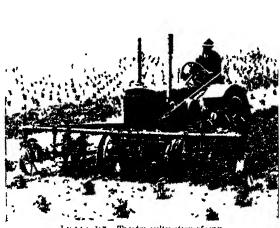
crops, as well as the variation in spacing in the same crop in different localities, provision is made for adjusting the rear wheel tread. Wheel rim and lug equipment are variously designed to work to best advantage in different crops and in different soil types.

## Attachments for Row-Crop Operations

Along with the development of this type of tractor came the development of attachments for performing the row-crop operations. In plowing and harrowing, the requisite tools are hitched to a drawbar that provides ample adjustment for operating them. For seeding small grains the drill may likewise be attached to the hitch bar. For seeding corn or cotton, attachments to the tractors are provided for check rowing (fig. 166), drilling, or listing up to four rows at one time. Fertilizer may be applied at the time of seeding by the use of a fertilizer attachment. After the crop has come up, cultivation until the crop is "laid by" may be continued with suitable implements pulled by the

tractor or with suitable tools attached to it. (Fig. 167.) Attachments are available for cultivating 2, 3, or 4 rows at a time. In spraying or dusting for insect control, as in dusting cotton or spraying potatoes, attachments may be mounted on the tractor and driven by the power take-off.

For cutting grass or hay crops, there are mower attachments driven by the power take-off, or two or more mowers may be pulled by the tractor. Sweeps and buck-rake attachments may be used for putting up the hay. Large grain binders are pulled by the tractor and operated by the power take-off. Small combines may be likewise operated from the power take-off; somewhat larger combines may be pulled by the general-purpose tractor while the mechanism is operated by a small auxiliary engine mounted on the combine. Corn binders are driven by the power take-off. Corn pickers are pulled by the tractor or, of differ-



List ki 167 — Tractor cultivation of corn

ent type, are mounted on it. Potatoes may be planted, cultivated, and harvested with tractor-operated machines. For threshing grain, for ensiling or husking corn, and for operating other belt-driven farm machinery, the general-purpose tractor is a convenient portable power generator.

If the grain is to be threshed by a stationary thresher, the separator and tractor may be quickly lined up and the work started. If corn is to be

put into the silo, the silage cutter is driven by the tractor. If the corn is to be machine husked, the necessary belt power is easily supplied.

#### Garden Tractor Devised

For motorizing farms that are divided into very small fields, such as those devoted to raising truck crops, the so-called garden tractor has been devised. Most of these develop between one-half and 2 or 3 horsepower at the draw-bar, though a few are somewhat larger. The operator walks behind, and guides the tractor as he would a horse plow.

The aggregate power available on farms in the United States is about 50,000,000 horsepower, while the connected horsepower of the manufacturing industries is approximately 40,000,000. The mechanical power on farms amounts to about 30,000,000 horsepower. The major part of this is now supplied by 1,000,000 tractors, four times the number reported by the census of 1920. A large and ever-increasing proportion of these tractors is of the general-purpose type. Farm trucks provide about 15 per cent of the mechanical power on farms. The number of these has increased from 139,000 in 1919 to 767,000 in 1929,

according to the census. With the increase in number of tractors and trucks has come a large decrease in the number of horses and mules. According to the 1931 Yearbook, the number of these on farms, January 1, 1918, was 26,428,000, and on January 1, 1930, only 18,643,000.

R. B. GRAY, Bureau of Agricultural Engineering.

# TILLAGE IMPLEMENTS OF NEW TYPES AND DESIGNS USED IN MODERN FARMING

Tillage machinery to-day comprises a vast number of different implements and tools necessary to meet the varied requirements of weed eradication, seed-bed preparation, cultivation, and other tillage operations essential to crop production. Furthermore, wide ranges of such factors as the size and kind of power unit, character of work to be done, soil type and condition, cropping system, and cultural practice require

a multiplicity in both types and sizes of tillage equipment.

While a few crude implements were devised for tilling the soil in earlier periods, the active development leading up to present-day equipment began about the middle of the nineteenth century. By 1900, machines that were on the market embodied the fundamental principles of many modern tillage implements. Since that time development has been taking place at an ever-increasing rate. More recently the widespread use of the tractor, and especially the introduction of the general-purpose or row-crop tractor, not only called for a complete new line of implements but also opened up great opportunities for the inventor and the designer. A better understanding of the objects of tillage as well as of soil dynamics, and more fundamental information on the feeding habits of plants, have aided greatly in improving and standardizing soil-working tools. A greater knowledge of the treatment of metals has improved the quality and permitted the introduction of refinements in all classes of machines.

### Distinctive Features in Modern Implements

Some of the distinctive features found among present-day implements are: Improved construction, better lubrication, durable metals for cutting edges and wearing surfaces, convenient and adequate adjustments, a large selection of interchangeable tools, easy manipulation,

and power lifts for raising the tools.

The plow has always been the basic tillage implement. Plow bottoms are generally of either the moldboard or disk type and differ in size and shape for different conditions. Gang plows with two or more bottoms are available to correspond to the size of the power unit. Attachments are provided to aid in turning under crop residues and pul-

verizing the soil.

The vertical disk plow (fig. 168) was first introduced on a large scale in 1927. This plow has certain features of both the disk plow and disk harrow. A series of vertical disks is carried horizontally at an angle of approximately 45°. The angle of the gang may be changed to regulate the depth of penetration. The vertical disk plow was developed for plowing wheat lands in the Great Plains area but has been successfully used under other conditions. Because of its rigidity the

plow is not well adapted to stony land. The furrow slice is not inverted and in grainfields the stubble is mixed with the soil, resulting in a ragged appearance. This, however, is an advantage in preventing soil from drifting and in obtaining good contact of the disturbed with the undisturbed soil. Draft is relatively light and rapid plowing can be done.

A combination plow and pulverizer known as the pulverator was introduced in 1928. This tillage implement is similar to a gang plow with short moldboards which only raise the furrow slice. By applying power direct from the tractor through the power take-off, slicing knives



Figure 168 - A vertical disk plow operating on wheat-stubble land

mounted on a vertical shaft at the rear of the moldboard are rotated rapidly against the furrow slice, which is thereby turned and pulverized. The soil is pulverized to form a uniform seed bed during the plowing, with comparatively small increase in power consumption.

Aftempts at direct tillage of the soil with rotating blades, hooks, and other tools are successful undersomewhat limited conditions. There are many plows for special pur-

poses; they include subsoilers, listers, middle bursters, bedders, brush breakers, and hillside, cane, orchard, and vineyard plows.

## Types of Disk Harrow

For preparing the seed bed after plowing, the disk harrow is very effective in breaking down furrow slices, particularly of sod, loosening firm soil, and destroying weeds. It is often used before plowing to cut up any crop residue or trash and to loosen the surface of the ground. The single-disk harrow has a left and right gang of either full or cutaway disks, the angles of which can be changed to obtain different depths of penetration. The soil is thrown toward either side of the machine, thus leaving a slight depression at the middle and ridges at the sides. The tandem-disk type has a second set of gangs attached at the rear, arranged to throw the soil toward the center; thus the soil is more thoroughly tilled and ridging is counteracted. Special types of such machines are built for use in orchards.

The spike-tooth or smoothing harrow has been universally used for many years to smooth and finely pulverize the soil. It is also used to break light crusts and to destroy sprouting weeds after a crop is planted. The more advanced type has levers by which the slope of the teeth may be changed. Another form of smoothing harrow has a curved knifetooth.

The spring-tooth harrow is usually of the same general design as the spike-tooth harrow except that it is of heavier construction and the

teeth ace long, curved, flat springs set to penetrate the soil. This implement is particularly adapted to stony land because of the elasticity of the teeth. Since the points of the teeth are curved forward, firm soil is readily penetrated and roots of objectionable weeds and grasses are brought to the surface. The work of either a disk or spike-tooth harrow can be approximated with a spring-tooth harrow by regulating the depth of penetration.

For crushing clods and firming the soil, rollers are available in different designs, such as smooth, corrugated (single and double cylinder),

tubular, and "crowfoot"

### Hitching Implements in Tandem

Two or more implements are frequently hitched in tandem for two reasons: (1) Several tillage operations are accomplished as one power unit travels over the field; and (2) tractor power is more efficiently utilized if a full load is drawn. In carrying this plan a step further, more than one of the standardized tillage mechanisms has been mounted on a single frame, or used in combination with seeding and fertilizing

equipment.

Cultivators and weeders represent a class of machines ordinarily used after the crop has been planted. They are for loosening the soil, controlling weeds, ridging, and providing proper drainage. Distinguishing features of present cultivators are: Multiple-row units; many kinds of interchangeable shovels, blades, disks, and other tools; great adjustability; and suitable controls and guiding devices to permit cultivation close to the rows.

Cultivating equipment for row crops varies in capacity from one side of a single row for the 1-mule system of corn and cotton farming to the full width of 36 rows or more for large-scale tractor systems of truck farming. If a multiple-row cultivator is to be used, a planter of the same row size or multiple thereof must be used, and only rows that have been planted simultaneously can be covered by the cultivator at one time.

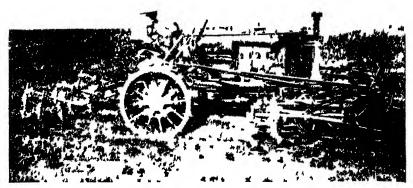
Horse-drawn cultivators of the 12, 1, and 2 row types for corn and crops of similar row-spacing have the improved features previously mentioned, but their general design is similar to that of earlier machines.

#### Motor Cultivators Introduced

In the use of mechanical power, motor cultivators have been introduced and one or more horse-drawn implements have been hitched behind the tractor. The general-purpose tractor recently introduced with suitable cultivating attachments, is readily adapted to the cultivation of various crops and different row spacings. A typical 4-row tractor cultivator is shown in Figure 169. The equipment, when mounted at the front of the tractor, permits direct guiding with the steering wheel, although on some machines the gangs may also be shifted. The gangs in some cases are raised by a power lift. Lister cultivators for tractors have guide wheels which follow in each furrow, thus permitting the mounting of hinged gangs at the rear of the tractor.

The rotary hoe used for early and shallow cultivation has only recently attracted much attention. It consists of two gangs of closely spaced, fingered wheels, free to rotate individually or in groups as the machine moves forward (Fig. 170.) The hoes or fingers are curved

to penetrate and loosen the soil. The rotary hoe is operated over the growing crop without material injury to the plants. It is effective in breaking soil crusts and destroying sprouting weeds. Rapid cultivation is possible since the draft is light and the operating speed may be



LIGURE 169 - Four row cultivating equipment mounted on a general-purpose tractor

relatively high. Light weeders with one or three rows of long slender spring teeth are used in a similar manner and for the same purposes as the rotary hoe.

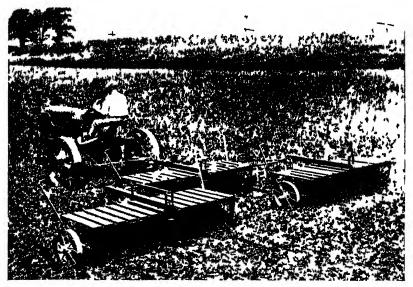


FIGURE 170.—Three rotary hoes cultivating young soybeans

#### Implements for Tilling Fallow Land

Among tillage implements for cultivating idle land in summer fallowing or after harvesting grain, the field cultivator either with stiff teeth or with duck-foot shovels is a late type. It is commonly built in sizes

of 6 to 12 feet width, and has a heavy frame with either rigid or spring tool shanks. The tools are staggered to permit some overlap of duckfoot shovels and to give sufficient clearance to prevent clogging. These cultivators thoroughly loosen the soil, form a clod mulch, and destroy any weed or plant growth, thus aiding to conserve moisture and in preventing soil drifting. Power lifts are provided for the larger machines.

Rod, knife, and other weeders of various types are also used for summer fallowing and similar work. The rods and knives extend continuously across the machine to insure the destruction of all plant growth. The most recent development is the rotary rod weeder in which a square rod revolves beneath the surface of the ground. The rotating motion is an aid in loosening the roots and in keeping the rod free of trash.

G. A Cumings, Bureau of Agricultural Engineering.

## SOME TYPES OF HARVESTING MACHINERY REACH HIGH STATE OF DEVELOPMENT

Harvesting machinery for small grain has probably reached a higher degree of perfection than machinery for harvesting any other crop The physical characteristics of such crops and the large amount of hand labor originally involved are chiefly responsible for the progress which has been made. Although the reaper, header, and self-binder greatly lessened the work of caring for the crop, a great deal of labor was still necessary in threshing the grain after it was harvested. As a further aid in reducing labor there is now a machine—the combine harvester-thresher—which cuts and threshes the grain in one operation

The combine was developed in California in an area where grain is grown under rather large-scale production methods. For this reason the early combines were large machines. When it was demonstrated that the combine could be used successfully in practically all areas where small grain is grown, small combines were soon in demand for the Middle West and East. Small combines were also in demand for harvesting soybeans, clover, and alfalfa, as these crops are often grown on farms where the acreage is not sufficient to justify the purchase of a large machine.

#### The Windrow Harvester

It was found that in some localities some crops could not be satisfactorily handled by the combine because of uneven ripening of the grain, the presence of weeds, or because of weather and insect hazards. The windrow harvester and pick-up attachments were developed to overcome these disadvantages. The windrower is in reality a header which deposits the cut grain in a windrow on the stubble rather than in a header barge. Under ordinary crop and weather conditions the stubble holds the cut grain up off the ground and any green weeds or damp grain will dry out in a few days. The pick-up is an attachment for the combine or for the combine platform and works in a manner similar to that of a hay loader. The cut grain is deposited on a conveyor and is threshed in the usual manner by the combine.

Some fundamental changes in design have also been attempted in order to produce a machine with fewer working parts and one which may be purchased and operated at a lower cost. However, the development of the combine is significant not only because it cuts and threshes

grain with less labor and expense than was formerly required but the first cost of a combine is often less than that of a threshing machine and the necessary harvesting equipment. From 1920 to 1930, inclusive, approximately 84,000 combines were sold in the United States.

The development and use of corn pickers, although not so spectacular as those of the combine, have been in progress for a number of years. The trend in design seems to be toward lighter but stronger machines of the 2-row tractor-operated type. Such pickers are operated by means of the power take-off, and are either pulled by a tractor or mounted on the tractor. While horse-drawn pickers are available, tractor power has proved quite satisfactory, in part because of the power take-off feature. The power take-off provides a more reliable form of power and a more uniform speed than power derived from a ground or bull wheel.

The combined harvester-thresher has had considerable influence on the design of corn pickers. At least one machine on the market is equipped with a tank to receive the corn from the husking rolls. Several attempts have been made to use the combined harvester-thresher for harvesting corn. Considerable work has also been done on a machine designed to harvest, husk, and shell corn from the standing stalk. Here again is seen an attempt to perform several operations with one

machine.

#### The Cotton Harvester

The problems involved in the development of a successful mechanical cotton harvester are doubtless the most difficult of any which have confronted inventors and designers of agricultural implements. This is due largely to the physical characteristics of the cotton plant and to the wide variations in soil, weather, and crop conditions under which cotton is grown. There are at present two types of cotton harvesters in the experimental stage. The stripper harvester removes all of the crop at one operation, whereas the mechanical picker is designed to gather only the open cotton. The stripper is a comparatively simple and inexpensive machine, but it gathers a great deal of trash, leaves, and burrs along with the open cotton. Cleaners have been provided and changes made in the stripping mechanism to overcome these disadvantages. Considerable progress has been made along these lines but the use of the stripper harvester has been confined to northwest Texas, where conditions are more suitable for its use.

W. M. Hurst, Bureau of Agricultural Engineering.

# ERODED AND TERRACED FARMS REQUIRE SPECIAL METHODS AND MACHINERY

A rather complete assortment of tractors and tractor-drawn and horse-drawn machinery is available for preparing the seed bed, planting, cultivating, and harvesting all kinds of grain and hay crops. The larger units of this machinery, such as 2-row, 3-row and 4-row cultivators, hay loaders, sweep rakes, 8 and 10 foot grain binders, and harvester-threshers cutting from 10 to 20 foot swaths are comparatively recent developments and do very satisfactory work on level or gently rolling land.

On more steeply rolling lands in parts of the country where severe erosion damage occurs, more difficulty has been experienced in the use of tractors and the larger units of machinery. Accordingly farmers on eroding lands have generally continued to use the smaller and lighter-weight machines which were universally used a generation or two ago. As a result, farmers on eroded lands are suffering a reduction in acre yields due to depletion of fertility by erosion and at the same time their acre costs of operation are high as compared to those of farmers able to use more efficient equipment.

The problem of developing machinery for economical cultivation of eroded or terraced land has not received a great deal of attention until

recently

Land subject to gully erosion is usually cut up by natural ditches or gullies into small fields of irregular shape. It is not unusual to see a 40-acre field cut into three or more patches. When such fields are planted to row crops there are likely to be a good many short "point" rows. It is usually considered that turning at the ends of such rows can be done more conveniently with single-row machines. If a 2-row or larger machine is to displace the single-row machine under these conditions, it must be designed to work out close to the ends of the rows and to turn around quickly in a small space.

On eroding land there are usually a good many small field ditches that are inconvenient to cross but still more inconvenient to go around. Small lightweight machines have some advantage in working over such ditches. With larger and heavier machines there is more inconven-

ience in crossing ditches and more danger of breakage.

## Flexibility in Machines Essential

The ground surface is always uneven on eroding land because soil is carried away by water flowing down between crop rows or natural depressions. Unless machines have an unusual degree of flexibility, uneven ground surface causes uneven depth of penetration of seeding and cultivating machinery. This results in poor stands of crops and poor control of weeds. These difficulties are considerably increased with larger machines unless they are specially designed to give flexibility.

When traveling across the slope of the land, machinery tends to slip sideways downhill. This makes it difficult to follow crop rows. Unless specially designed for this condition, a 2-row cultivator is more difficult to manage than a single-row walking cultivator. In some localities crop rows are usually planted on contours; that is, the rows curve around the hill on level lines. Cultivators sometimes do not follow these curved rows accurately enough to prevent damage to the

cron

The difficulties mentioned above apply particularly to eroding land that has not been terraced. When the land is terraced the natural field ditches are eliminated. To this extent, terracing very materially improves conditions for the use of larger units of machinery. On the other hand, the terrace ridges themselves must be farmed and they offer some obstruction to the use of machinery. A machine that will successfully cultivate a terrace ridge must have a great deal more flexibility than is required for cultivating level land. (Fig. 171.) A single-row walking cultivator can work over terraces without difficulty (fig. 172), but 2-row cultivators are less flexible and are not always satisfactory for terraced land.

### Steep Slopes Present Difficulty

The problem of designing machinery with enough flexibility to work satisfactorily over terraces might seem simple at first thought. There is no great difficulty in designing machines to work well on terraced land having slopes of 5 per cent or less, but much cultivated land is

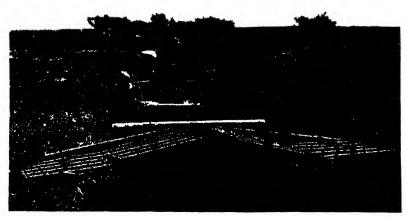


FIGURE 171 — Four section harrow tilling top and sides of a terrace A flexible assembly is necessary for satisfactory results

considerably steeper than 5 per cent. (The percentage of slope is the number of feet rise in 100 feet of horizontal distance.) In parts of the Corn Belt and general-farming regions, fields having 15 to 20 per cent slopes are not uncommon. In the wheat areas of the Northwest, slopes

FIGURE 172 —Single-row cultivator with balanced frame operating satisfactorily across terraces

as steep as 60 per cent are under cultivation.

Until recently erosion has not been considered a serious problem on the wheat lands of the Northwest. No system of terracing for control of run-off on such steep slopes has yet been devised. Mangum terraces are not adapted to land having slopes much if any steeper than

about 15 per cent. On terraced land with 15 per cent slope, machinery will require a high degree of flexibility in order to operate satisfactorily. Row-crop machinery will also require ability to stick to the side of the hill without slipping sideways. (Fig. 173.) The required degree of flexibility will be especially difficult to attain in hay machinery such as side-delivery rakes, sweep rakes, and hay loaders.

To solve the problem of adapting large machinery to necessary measures for control of erosion requires cooperation between machinery manufacturers and those who design terraces. The machinery manufacturer will need to go as far as he can economically go in adapting his machinery to the desired shape of terrace; then the farmer may have to modify the desired shape of terrace to meet the limitations in machinery design.

Farmers may also have to use more ingenuity in operating machinery over terraced land. Farmers in the Northwest have learned to operate large harvester-threshers on 60 per cent slopes, not terraced. Probably no greater difficulties will be involved in operating well-

designed machinery overterraced land having 15 to 20 per cent slopes such as found in general farming

regions.

It is evident that changes are necessary in methods of farming lands subject to severe erosion. If these lands are to continue in cultivation, erosion-control methods that will prevent soil destruction and make maintenance of fertility pos-



FIGURE 173 — I wo-row tractor planter working along the lower slope of a terrace

sible must be adopted. To operate this land profitably, it appears necessary also to provide efficient operating equipment that will enable farmers to produce crops at low cost.

CLAUDE K. SHEDD, Bureau of Agricultural Engineering.

### RURAL ELECTRIFICATION GROWS AS FARMERS FIND NEW USES FOR ELECTRICITY

In this power age, no single agency has brought such comforts and conveniences to the farmer and his family as the use of electrical energy, which is now fast becoming an economic factor and a force for efficiency.

To-day about 1,000,000 farms are using electricity, supplied either by electric-power companies or by individual plants. Of this number, more than 644,500 have high-line electric service. This is 10 per cent of all farms in the country. It is nearly four times the number so served in 1923. Since that year there has been a steady increase in the number of farms served with electricity, and the last year's gain of 90,800 over the 1930 total is the greatest increase made in any one year. The estimated number of independent or unit farm-lighting plants is between 300,000 and 400,000.

As the farmers have learned the value of electricity, the consumption has likewise increased. During 1930, farmers bought 1,779,940 kilowatt-hours of electrical energy at a cost of \$46,187,000, according to a recent report of the power industries. The consumption is equivalent to 2,385,000,000 horsepower-hours of energy reported as used annually

by farmers.

Supplying electrical energy to farmers began about 1899, when a power company extended service to several small towns in California and contracted generally to supply power to farms for driving irrigation pumps. Between that time and 1910 the gasoline engine was gradually superseded by the electric motor, and since 1910 electricity has been the preterred power for irrigation pumping in California. Rural electrification has proceeded rapidly, until to-day it is estimated that between 60 and 80 per cent of all California farms have electric service.

Use of electricity on farms in other States developed less rapidly. The principal reasons doubtless were the larger average size of farms, with fewer users per mile of transmission line, and the lack of some general use like irrigation pumping for large amounts of power. By 1923, however, farmers in many sections of the country had become insistent in their demands for electric service, yet the utility companies felt they could not deliver the power at a price that the farmers could

pay.

#### Committee Studies Problem

In furtherance of a common interest, a committee on the relation of electricity to agriculture was formed to study the problems of economical distribution of current in rural districts and of profitable use of electricity in agriculture. On the original committee were representatives of the power interests, of farm organizations, of manufacturers of electrical equipment, and of several governmental departments. It was recognized that rural electric service, to be a success, must yield a profit to the farmer and also to the power company.

The committee adopted a program of investigation to find out what electricity could do and what it could not do advantageously on the farm. The studies were conducted in cooperation with State agricultural experiment stations, where laboratory facilities and a trained personnel were available, and in the beginning were supported largely by contributions from private agencies. Where the studies have grown to major importance, State funds have been made available for con-

tinuing or enlarging them.

Prior to 1923 there was no organized program of research in electrification of farms. Some progress had been made in studying the use of electricity in pumping for irrigation and for drainage; in the dehydration of fruits, nuts, and hops; and in operating individual water systems and lighting plants. Little attention had been given to developing

special uses in the farm home and about the farmstead.

Following the formation of the national committee, State committees were set up; in fact, such a committee was organized in Minnesota before the national committee. The State committees include representatives from agricultural experiment stations and agricultural extension services. They are devoting their efforts largely to the development and testing of equipment and methods for the immediate use of electricity on farms, and many have become extension agencies. Local conditions determine whether a committee puts primary emphasis upon research or upon extension work, or undertakes both lines of activity.

Information Widely Spread

As rapidly as experimental practices are proved satisfactory through research studies, the information is spread by demonstrations and other methods. Some activity in rural electrification is in progress by the agricultural colleges in 40 States, 14 of which have definite extension programs. Educational expansion programs in farm uses of electricity are increasing in agricultural colleges. Such programs have for

their foundation the facts obtained through research.

Minnesota was the first State to have an experimental farm electric line. It reached nine farmers near Red Wing, whose farms were equipped with all kinds of electrical appliances, loaned by manufacturers, such as motors, feed grinders, electric stoves, milking machines, and vacuum cleaners—also pumps and water systems. This line and similar lines built in 15 other States furnished data on the uses and

costs of electricity, and more farmers began to request the service. As a result, power companies and equipment manufacturers have seen fit to improve their services

and products.

Since 1924, the power companies have improved their equipment to furnish 24hour-per-day service. They are building farm lines more cheaply, and have discovered that, if the farmers of a community use electricity as it can be used, they will use as much power, and in many cases, more, than the average urban community of equal line mileage. Many electric light and power companies have installed rural-service departments to work with farmers on elec-



Fig. RL 171—Sharpening mower knives with portable-inotor grinding rig

trification, and to give advice on wiring farmsteads. They realize that inadequate wiring alone may limit the amount of electrical energy used to much less than the farmer could use profitably.

Manufacturers of equipment are cooperating with the agricultural engineers and the power companies and with the famers in designing and producing appliances at prices the farmer can pay. They are redesigning and improving such equipment as feed mills, silage cutters, brooders, and milk-cooling and storage plants. Some new equipment, such as poultry water heaters, has been designed. Manufacturers have redesigned their lines of power-operated equipment to make them suitable for electric-motor operation, and are making portable motors mounted on wheeled trucks, and smaller sizes that can be carried by hand. (Fig. 174.)

The popular uses for electricity on the farm are lighting, running small household appliances (fig. 175) and operating water systems

(fig. 176). Where availability of this convenient form of power has led to the installation of running water, it has done more than any other one thing to make farm living enjoyable. In designing household

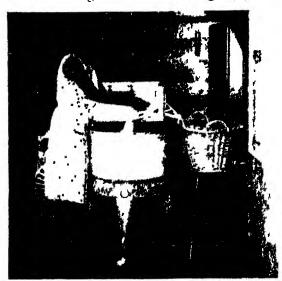


Fig. RI 175 -Corner of in electrified firm laundix

refrigerators and domestic water-supply systems, the makers are taking advantage of automatic control. Several feed-grinding plants also have been built with either automatic or semiautomatic controls.

### Supplanting Hand Labor in Dairying

Electricity is proving highly useful on many dairy farms, where it is taking the place of hand labor in doing burdensome chores. It runs the milking machine and drives the cream separator. It cools the

milk, or makes ice for keeping the milk cool on the way to town. It pasteurizes the milk, washes and sterilizes the bottles and caps them. It

runs the separator and churn. It sterilizes the milk cans, solders holes in them, heats water for cleaning the dairy, runs the ventilating fans, and helps in cleaning the cow stalls.

On poultry farms, electricity is used to hatch eggs in incubators, to broad the chicks, to warm drinking water, to run fans for ventilation and for drying litters, to sprout oats for green feed, and to operate a spray gun in killing vermin. An electric motor runs the feed grinder, mixes the feed, cleans the grain, and elevates feed or grain into the bins. A very general use of electricity is for lights to prolong the feeding period and secure increased egg production during the winter.

Large fruit farms are using electricity in spraying, fruit wash-



FIGURE 176 —Electrically operated faim pump, with automatic shut-off switch

ing and grading, cider pressing, and refrigeration in cold-storage plants.

Among the more recent uses of electrical energy is the heating of soils and hotbeds. Some experimental work in these lines has been

conducted by several agricultural experiment stations, with promising results. Electricity has been found particularly useful in operating equipment for dehydrating crops where close regulation of temperatures must be maintained.

In the use of electricity for heating soils and hotbeds, Norwegian and Swedish engineers were the pioneers. Farms in many European countries, particularly Germany, Norway, and Sweden, are supplied with central-station service, and electricity is used for lights and many small power applications about the farmsteads. Sweden has thousands of electrically operated threshing rigs. Much of the research pertaining to the use of electricity in agriculture has been initiated outside of the United States, and includes electric plowing in France, silage making in Germany, soil heating in Norway, and electric seed treatment in Australia. The latter country offers available electricity as one of its chief inducements to attract farmers.

S. H McCrory, Bureau of Agricultural Engineering.

# AMERICAN MACHINERY IS INFLUENCING AGRICULTURE GREATLY IN OTHER LANDS

The design and development of farm machinery and the application of mechanical power in agriculture in the United States have been reflected, to a greater or less degree, in the changing agricultural practices in other lands. The use of American-made machines, and the changes in foreign designs to correspond, have contributed in no small way to the adoption of more efficient methods in producing crops.

This change was considerably accelerated by the World War, which drew heavily on the able-bodied man power of the farms of Europe The urge for greater accomplishments by one pair of hands became paramount. Tractors, tractor plows, and other power machinery were imported, mainly from North America, to increase the output of the average worker. Adoption of such equipment has involved radical change or abandonment of many time-worn customs suited only to small-scale production, in order to operate on a larger scale. Small fields, in many instances smaller than 5 acres and adapted only for horse-drawn machines, were joined. This required the filling of drainage ditches, the removal of hedges and stone fences, and often the utilization of land that had not been cultivated for centuries; all to permit of using the more efficient power and machinery methods.

At the close of the war, the increased living costs resulted in a demand by farm labor for higher wages. This condition hastened the adoption of labor-saving agricultural machinery, until now nearly every country in western civilization uses American machinery and methods.

### One-Man Outfit Adopted

Before tractors were used extensively in Europe, the plows in common use cut furrows less than 12 inches wide. If pulled by tractors the plows were, in many cases, adaptations of horse-drawn equipment and two men were required to operate them—one to drive the tractor, the other to ride the plow. With the arrival of American tractors and plows, 1-man outfits were available, as the plows were of the self-lift type and could be adjusted from the tractor-driver's seat by easily

accessible levers. The plows cut 14-inch furrows, and in many cases they were fitted with rolling colters, a radical departure for Europe. Considerable objection was raised at first because of the extra width of furrow, the type of share and moldboard, and the colter; however, the

1-man outfit was soon accepted as economical.

To keep pace with the advancement in tillage equipment and to utilize the power available in the tractor, larger seeding units were needed; 8-foot and 10-foot drills, in many instances hitched in twos, threes, and fives, speeded up the planting of grain. The cultivating equipment already in use in Europe was less difficult to adapt to use with the larger power units. Existing implements were hitched together fairly successfully, although some American machinery appeared,

including the rotary hoe and spring-tooth and disk harrows.

For grain harvesting, the binder of American origin was introduced. At first it was used singly, but when tractor power became available hitches were devised that permitted hauling as many as six 8-foot binders at one time. This was necessary to keep in step with the large-scale tilling and seeding operations noted above. Threshing formerly was done by the European thresher of practically all-wooden construction, which was fitted with a fluted bar-type cylinder. With this machine probably only 400 bushels per day could be threshed. In certain parts of Europe this type of thresher is gradually being superseded by that used in North America, with all-steel body and spiketooth cylinder.

## American Type Haying Tools Used

For handling forage and hay crops, tractor-mower attachments have been adopted, together with other American-type haying tools. Hay balers, capable of baling hay or straw into more compact units than was previously possible, have come into use in some regions. This has aided handling and has minimized the storage space requirement. Hay

driers are in use in some places, to a limited extent.

Because of the wide application and the practicability of the combine harvester-thresher in the United States, a number of the foreign countries have appreciated its worth and imported such machines. Some have even started to manufacture them. Great Britain, Germany, and Russia are harvesting considerable acreages of grain with this creation of the New World. With the advent abroad of this machine there arose, as in the central and eastern parts of the United States, a need for grain driers. Investigations of equipment for this

purpose are in progress, and a few driers are in regular use.

Many other machines and operations have been affected by developments in the United States. Among these is machinery for the production and harvesting of sugar beets and of potatoes, also machinery including the silo filler, used in the production and processing of corn. The manure spreader is another machine of American development that has been adopted in Europe. Formerly manure was pitched from the barnyard into the wagon, taken to the field, and dumped in piles from which it was laboriously spread with pitchforks. On the more modern farms litter carriers and manure spreaders have been introduced, thereby reducing the amount of labor required and making possible the more uniform application of the manure to the land.

### Applications of Electricity

As a result of the intensive studies and adaptations for using electricity on farms in the United States, certain applications have spread abroad. Some types of crop driers now make use of this power. Some milking machines are also operated by electricity. Some Europeans have gone a step farther than Americans, however, in rural electrifica-

tion, and have developed a practical cable plowing outfit.

Adaptations and applications of the agricultural machines that have been mentioned may be found in many quarters of the globe, and their use is becoming more general and is extending into new regions. Although this discussion applies mainly to Great Britain and continental Europe, American machines and methods have penetrated to Egypt where tractors are used in leveling for rice growing and a wide variety of agricultural tools and corresponding practices have been adopted, and to South America, where harvesting is carried on in Yankee fashion.

The importance attached to our part in increasing production and reducing costs in agriculture is clearly emphasized by the exhaustive tests being made of American machines at the more important foreign agricultural experiment stations. Our exports of farm equipment reached a maximum value of \$112,870,000 in 1929. This was roughly one-fourth the value of all farm equipment sold by United States manufacturers in that year. More than half of this export value was in tractors, and more than one-fourth in harvesting machinery, plows, and listers. Agricultural engineers and others from many lands are studying American farming practices, which shows that American resourcefulness and ingenuity are greatly influencing the agricultural readjustment of the world, and that the progress made on farm machinery in the United States is being keenly watched abroad.

R. B. Gray, Bureau of Agricultural Engineering.



## LAND-UTILIZATION PROBLEM, INTENSIFIED BY DEPRES-SION, DEMANDS NATIONAL POLICY

The expression "land utilization," formerly principally a technical term, has come to have significance for the average citizen. During the last decade more and more interest in the problems of land utiliza-

tion has developed.

This awakened interest grows out of a number of significant changes in the rural economy of the Nation. Formerly our national outlook was unlimited increase of population and a continually increasing pressure on available land resources. Even a decade ago the food shortages of the World War, wrongly attributed to scarcity of land rather than to scarcity of labor, gave rise to extensive plans for stimulating

agricultural expansion.

This outlook has been materially altered during the last decade, as is brought out in more detail in other articles of this YEARBOOK. Birth control, under the impulse of urban standards of living, and restrictions on immigration forecast an ultimate population probably not more than 20,000,000 greater than at present—a population that may even decrease in time. The increase of populations of other industrial nations, comprising hitherto the best markets for American farm products, shows similar tendencies, and the export markets for our farm products have been materially restricted by foreign trade policies and credit dislocations. Competition in our export markets and even in our domestic market has been intensified by the expansion of farming into semiarid areas, extensive land reclamation in various countries, the recovery of European agriculture including that of Russia, and the increased production of tropical products. Throughout the civilized world national policies have aimed at stimulating agricultural expansion. Much crop and pasture land in our own country has been economized through the substitution of mechanical power for horse power. There has been a notable expansion of our farming area in the Great Plains and through the reclaiming of fertile areas with favorable topography in various parts of the country, at the expense of less-favored lands formerly advantageously cultivated.

Our outlook with regard to what our lands will be needed for and can be used for has been profoundly altered by these developments, as well as by a better knowledge of our potential land resources. We now know that, in the present century at least, we shall not need to cultivate quite half of our potential arable acreage and that we can devote more than one-fourth of our total land surface to forests. wild-life refuges, or other uses, without encroaching seriously on land required for crops and pasture.

## Problem Emphasized by Prolonged Depression

A decade of subnormal economic conditions in agriculture, culminating in a drop into probably the deepest abyss of depression American farmers have ever experienced, has created serious problems of adjustment in land utilization, especially in those sections where topography, soil, and climate are not especially favorable to present-day methods of farming. Extensive areas of farm land have become tax delinquent or have been abandoned. In many of these regions tax delinquency is further increased by the presence of large areas of cut-over land on which the owners are no longer able or willing to pay taxes. Tax delinquency and farm abandonment, in turn, have created serious financial problems for townships, counties, and States. As revenues are reduced, the burden of taxation is increased for those farmers and timber owners who remain, and the justification for maintaining certain schools and roads in areas where the population is thinning fre-

quently becomes questionable.

The solution of this extensive problem of idle lands will require the cooperation of Federal, State, and local governments. For one thing, it is wholly illogical to continue the policy of attempting to resell foreclosed lands not adapted to private utilization, in accordance with the immemorial practice of most of the States. Few States at present have any systematic program for administering the large areas of taxdelinquent lands that they are being forced to take over and retain through lack of a market. In some States such lands are taken over by the State itself, in other cases by the counties, or even by townships or minor civil divisions. Many of the units of local government neither can afford to lose the revenues from the tax-delinquent lands nor are competent or financially able to undertake the administration of large areas of idle land. This does not mean that in some instances the development of county forests or parks may not be desirable, but merely that units of local government in general are quite incapable of dealing adequately with the problem of idle land as a whole.

## Tax Problems Attacked Along Several Lines

It is clear that the idle-land problem interpenetrates the whole difficult problem of State and local taxation. It is generally recognized that rural real estate is bearing a disproportionate share of the total State and local tax burden. In many cases private utilization of land is being penalized and lands forced into tax delinquency which could continue in private ownership under a more moderate tax burden The solution of these problems will require a number of lines of action, some of which have already been undertaken in certain States. These include:

(1) Assumption by the State of part of the cost of local government in order to lighten the burden on rural real estate.

(2) Better adjustment of the tax burden in accordance with the tax-

bearing capacity of various classes of land.

(3) Economics in local government through—(a) elimination of schools and roads in sparsely settled areas, this perhaps depending upon

a program of encouraging the complete abandonment of residence in such areas and zoning against resettlement; (b) increasing the efficiency of local offices and services so as to reduce costs; (c) consolidation of functions either through the cooperation of counties or through combining them in larger units.

### Public-Ownership Program

After all these various adjustments are made, however, it is becoming clear that we shall have to provide for a larger program of public ownership of land. This grows out of the fact that in our earlier land policy we threw into private ownership lands which should have been retained for public advantage. For one thing, there is a large acreage that falls below the margin of profitable private utilization. This is the case with much of the cut-over land and with a good deal of the poorer farm land, especially where the fertility has been impaired by erosion or overcropping. We have permitted private individuals to skim the cream, and now we shall be forced to dispose of the skim milk. Furthermore, there are classes of land that can not continue in private ownership without a detriment to public welfare. Such lands include: (1) Farms in sparsely settled areas which entail unduly high costs for the maintenance of public institutions and services; (2) lands that can not be profitably utilized by private individuals without serious soil wastage; (3) lands that should be retained in forests or pasture in order to protect watersheds; (4) timbered areas that should be managed on a permanent-yield basis because the local agriculture and industry are essentially dependent on a continuous supply of timber; (5) bird and game refuges; (6) areas especially adapted to serve as recreational areas which should be preserved for public use as Federal, State, and local parks; (7) lands that periodically are thrown into cultivation in periods of high prices or unusual rainfall but are not adapted to permanent cultivation; (8) miscellaneous areas needed for various public uses, such as military reservations, water power and reservoir sites, etc.

#### Guidance of Land Settlement

Another important element in national land policy is the more adequate guidance of land utilization and settlement. It is generally recognized that past and present methods of land settlement result in serious mistakes and are extremely wasteful both of land resources and of human life and effort. A vast amount of money has been wasted also in the development of ill-advised drainage and irrigation projects, as well as in land settlement by private individuals. The continued application of our homestead policy to areas incapable of maintaining a family on the amount of land allotted, also leads individuals into futile and costly attempts at land settlement, besides injuring the established range industry.

The essential basis of all the various types of readjustment that have been mentioned in this article is an official economic classification of land to determine what class of use it is best adapted to, and whether it is best suited for private or public ownership and utilization. Such a classification should be modified from time to time as conditions

change.

We have also reached the parting of the ways in the matter of reclamation policy. It is frankly admitted by advocates of Federal reclamation that the areas remaining to be reclaimed by irrigation can not be reclaimed at costs that can be supported by farming alone without some form of governmental subsidy. It is being proposed that, in addition to granting interest-free funds, as in the past, the Government subsidize reclamation further by utilizing the revenue derived from power developments. There is active agitation for the extension of Federal reclamation to the drainage of lands in the humid sections of the country, more or less in connection with flood-control projects. In the next few years the American people will need to determine whether Federal and State land policies shall be directed toward the stimulation of agricultural expansion or whether such stimulation is justified in view of the perennial tendency toward overexpansion.

### Consolidation of Scattered Holdings

Another important task is the consolidation of scattering land holdings which are not sufficiently compact or of a size adequate for economical utilization. The homestead policy and grants of alternate sections to railways and scattering sections to States has resulted in thousands of units in dispersed ownership, Federal, State, and private, frequently by absentees. Bringing together these scattering holdings into units adapted to economical use or administration will be an

important objective in future land policy.

The remaining public domain itself, now utilized as a grazing commons, has been subjected in many places to a régime of competitive grazing which has seriously depleted the forage cover, resulting in increased erosion and contributing to the severity of flood devastation, not to speak of the confusion and uncertainty to which the livestock business has been subjected. Opinions differ as to whether the solution will consist in turning these lands over to the States in which they lie, after reserving certain areas for Federal retention, or whether it should take the form of regulated utilization under Federal auspices. A presidential commission has recently recommended in substance the first-mentioned policy.

L. C. Gray, Bureau of Agricultural Economics.

# NATIONAL CONFERENCE RECOMMENDS PROGRAM OF STUDY AND ACTION

The National Conference on Land Utilization held at Chicago, November 19 to 21, 1931, was probably the first important gathering in the history of the United States to outline a comprehensive national land policy, as distinguished from topical or regional segments of a policy. The conference was called by Arthur M. Hyde, Secretary of Agriculture, in collaboration with the Association of Land Grant Colleges and Universities.

Representatives were present from the United States Department of Agriculture, most of the land-grant colleges and universities, the Federal Farm Board, the Bureau of Reclamation, the Federal Farm Loan Board, the Federal Board for Vocational Education, the Asso-

ciation of Commissioners and Secretaries of Agriculture, the leading national farm organizations, a score of the most important railway systems, the Chamber of Commerce of the United States, and about two score organizations concerned with banking, insurance, forestry and conservation, land economics, engineering, and the farm and news press. Probably no more widely representative and experienced group ever met for the consideration of national land problems. More than 350 delegates were registered.

The program of the conference provided for two days of addresses, papers, and informal discussions, and a third day devoted to the consideration and adoption of recommendations of the conference, formulated by a broadly representative committee. The proceedings of the conference, which include addresses by the Secretary of Agriculture, the chairman of the Federal Farm Board, and a large number of papers by foremost authorities on land problems, constitute a comprehensive and significant manual on the subject of land policy.

### Significant Recommendations Adopted

The conference adopted a group of significant recommendations as the majority sentiment of its membership. In general, these recommendations look toward the rationalization of agricultural production and land utilization, the conservation of national resources, and the

safeguarding of the national welfare in the use of land.

The conference recommended Federal administration of the public domain, with a view to the rehabilitation of public ranges and the protection of watersheds; the consolidation of scattering State and Federal holdings through exchange; the expansion of the outlook program of the United States Department of Agriculture, an inventory of land resources and an economic land-use classification as a basis of land policy; restriction of homesteading to lands capable of maintaining a decent standard of living on the maximum area granted; tax reform to relieve the excessive burden on farm and forest land and adjust taxation to the type of utilization for which each class of land is adapted and to its tax-bearing ability; licensing and regulation of land-settlement enterprises; restriction of Federal reclamation to the completion of projects already started and the rehabilitation of deficient water rights on lands now cultivated and occupied, with no new reclamation projects to be initated until justified by the agricultural needs of the Nation; steps for the prevention or reduction of soil erosion and other forms of soil depletion.

The conference devoted special attention to the problem of submarginal land. It recommended the coordination of State and Federal policies to withdraw submarginal crop lands from cultivation and utilize them as forests, game refuges, and other purposes. In this connection the conference recognized the need for discontinuing the resale of tax-delinquent land not adapted to cultivation and the necessity for a broader program of Federal and State acquisition and administration of lands not adapted to profitable utilization by private

enterprise.

### Two Permanent Committees Recommended

In order to insure the carrying out of its recommendations the conference requested the Secretary of Agriculture to take steps for setting up two permanent committees, namely, a national land use planning committee and a national advisory and legislative committee on land use. The membership of the first committee, which is a technical body, is to include representatives from various Federal bureaus dealing with rural lands, and representatives of the Association of Land Grant Colleges and Universities. The advisory and legislative committee will comprise representatives from the principal national farm organizations, the Chamber of Commerce of the United States, the National Association of Commissioners and Secretaries of Agriculture, the American Forestry Association, the American Agriculture Editors' Association, the American Railway Development Association, the National Sheep and Wool Growers, and the National Livestock Association.

L. C GRAY, Bureau of Agricultural Economics.

# PRESENT TRENDS INDICATE FARM AREA OF UNITED STATES NOT LIKELY TO INCREASE MUCH

In studying the land problem the first step is to consider the probable future need for farm land. This is dependent, obviously, upon the future consumption of farm products, on the one hand, and upon production per acre on the other hand. Let us consider first the prospect for consumption of farm products. This depends, in turn, upon three factors, population growth in the United States, consumption per

person, and exports.

The most important of the factors affecting the future need for farm land is the Nation's population. At present over 90 per cent of the farm land is used to produce for the domestic market. Ten years ago, indeed as late as 1923, the population of the Nation was increasing nearly 2,000,000 a year. Now the increase is scarcely 900,000. (Fig. 177.) Between 1921 and 1931 the number of children born in the United States dropped from about 2,940,000 to about 2,300,000, net immigration declined from 300,000 in 1921 and 1922 to a net loss of over 70,000 in 1931 (emigrants exceeded immigrants), and the number of deaths increased. The increase in deaths was not because people were dying younger, but because there is an increasing number of old people. The number of people over 65 years of age increased 34 per cent between 1920 and 1930, according to the census, whereas the number of children under 5 years of age decreased 1 per cent. Because of the increasing number of old people, deaths will almost certainly increase more rapidly in the future.

The prospect is for an increase in population during the next 10 years of about half that shown by the census for the decade 1920–1930, unless the immigration restrictions are relaxed; for an increase in the decade 1940–1950 only about a third as large as that in the past decade; and for a stationary population about 1960. This stationary condition will persist for a decade or more and may be followed by a decline. In other words, the maximum population of the Nation in the future, unless births or immigrants increase, will be only 15 to 20 per cent greater than at present. This increase, though spread through three decades, is about the same as that during the past

decade.

### Consumption Per Person

Consumption of farm products per capita has remained remarkably constant for 30 years at least. In two years during the World War it sank about 4 per cent beneath the level at the beginning of the century (average for 1897–1901), and during two years of urban prosperity, 1926 and 1928, it rose about 6 per cent above this level. During the year 1930, despite the economic depression, consumption of farm products per person was a little above (about 1 per cent) the 1897–1901 level. This variation in per capita consumption is not caused primarily by people's eating more food, on the average, but to a smaller or greater consumption of the more expensive foods, principally meat and milk, with corresponding changes in the less expensive foods, principally the cereals. In view of the rapid approach of a stationary population, unless the immigration restrictions are relaxed, it appears

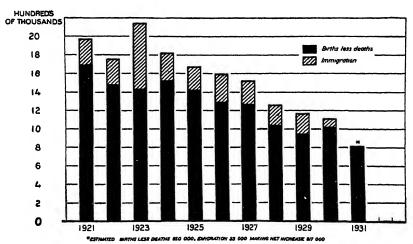


Fig. RE 177 — Population increase in the United States, 1921-1931 — Ten years ago the population of the United States was increasing by nearly 2,000,000 a year Now the increase is 1,000,000 or less. Births were 2,800,000 or more annually as late as 1925, but by 1931 had fallen to about 2,300,000, while death is have increased from about 1,300,000 to 1,400,000. Net immigration has been reduced from about 300,000 in 1921 and 1922, and over 700,000 in 1923, to a net loss of more than 70,000 in 1931. A stationary population is approaching with much greater rapidity than anyone surmised five years ago we possible

unlikely that per capita consumption of farm products will vary much, if any, more in the future than in the past. In other words, total domestic consumption of farm products in the future is likely to depend primarily on population.

### The Trend of Exports

In recent years (since 1927) exports have constituted only about 10 per cent of the value of net agricultural production in the United States and have required about the same percentage of the crop land for their production. (Fig. 178.) This is only about two-thirds as large a proportion as that of a decade earlier. In northwestern Europe, where most of the exports have gone in the past, the birth rate has been declining rapidly, until in most of the countries it will scarcely maintain population permanently; and in England, Germany, and Sweden not enough daughters are being born to replace the

mothers of the present day. On the other hand, agricultural technic is advancing in northern Europe as in North America, and production

is increasing.

Moreover, the intensification of the nationalistic spirit which accompanied the World War, and the consequent desire for national security in food supply, brought in, like an undertow, a notable wave of tariff enactments. In Germany the tariff on wheat is \$1.63 a bushel, while in France and Italy, although not so high, it is practically prohibitive. Even Great Britain, the greatest foreign market for American farm products, seems likely to adopt soon a tariff on many farm products. Only to the Orient are exports of farm products increasing.

Whether exports to Europe will increase with recovery from the economic depression, or whether eastern Asia will be able to buy enough farm products in the future to counterbalance the recent de-

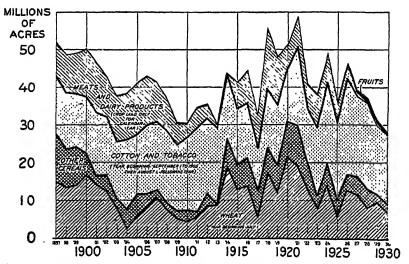


Figure 178.—Approximate acreage required to produce net exports of major farm products, 1897–1929. Exports of farm products, as well as number of births and of immigrants, have been trending downward during the last decade. In 1930 the acreage required to produce the agricultural exports was only a little over half that required in the years immediately following the World War, and was lower than at any time since the beginning of the twentieth century.

cline in European purchases the future alone can reveal. It appears unlikely in any case that exports will more than double in the next few years, and the outlook, therefore, is for an increase in demand for farm products varying more or less directly with the population of the United States.

## Increase of Agricultural Production Per Acre

Since the World War agricultural production per acre has been

increased in at least five ways:

(1) By the substitution of gasoline engines for horses and mules. The decline of about 8,400,000 horses and mules on farms, and of probably over 1,000,000 more in cities, between 1918 and 1931, has released nearly 30,000,000 acres of crop land, which has been used mostly to feed meat and milk animals and to produce cotton. This is equivalent to an increase of fully 10 per cent in the effective crop

acreage of the Nation (excludes land required to feed horses and mules).

(2) The increase in animal products (meat, milk, wool, etc., other than power) has been about 23 per cent, whereas crop feed available has increased not more than 10 per cent, while the feed from pasturage probably has declined slightly. This increased production of milk and meat per unit of feed consumed, assignable to culling of the cows, slaughter of cattle, sheep, and swine at an earlier age, reduction in death losses, particularly among hogs, a vast shift in pork production from the South to the Northwest, where the stock is better, and many other causes, has probably added the equivalent of 25,000,000 acres to the crop area.

(3) Less important, yet a significant factor, particularly from the standpoint of crop land requirements of the Nation, has been the

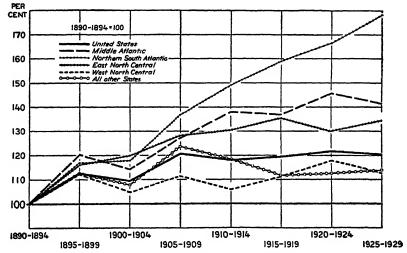


FIGURE 179.—Changes in composite yield per acre for corn, wheat, oats, and potatoes. The trend of acre yields of the crops taken as a whole and in the United States as a whole, has remained stationary for more than 20 years. But in sections of the United States where fertilizers have been extensively used, as in the northern South Atlantic States (North Carolina, Maryland, and Virginia) crop yields have increased greatly. When higher prices of farm products provide farmers with money to buy fertilizers, such increases in acre yields are likely to develop in other portions of the United States

shift from crops less productive per acre to crops more productive; notably in the South, from corn toward cotton, a crop which is worth much more per acre, from wheat toward corn in the North, and from grain and hay toward fruit and vegetables in several areas, notably in California.

(4) Likewise there has been a shift from beef cattle toward dairy cattle, hogs, and chickens, which produce much more food per unit of feed consumed than do beef cattle.

(5) Least important of the ways in which production per acre has been increased since the World War has been an increase in acre yields of a few crops. Totaling the important crops, including fruit, it appears that the average acre yield has remained about stationary since the World War. (Fig. 179.) Indeed, there has been a slight decline in the last three years, doubtless owing largely to adverse weather conditions

Nearly all the increase in agricultural production per acre, therefore, can be assigned to the decline in horses and mules and to improvements in animal husbandry. These two factors alone have added the equivalent of, roughly, 55,000,000 acres, to the effective crop area since the World War. This is an increase of about 18 per cent. It is principally these two new factors which have enabled the total crop acreage to remain almost stationary while agricultural production increased about 20 per cent.

### Prospective Factors in Production

Will these factors that have increased production so greatly on a stationary crop acreage continue to operate even half so effectively during the next decade? And, looking beyond, will these factors provide food and fibers three decades hence for the 15 to 20 per cent increase in population without any increase in the crop acreage? These are questions no person can answer with assurance, but the following facts deserve consideration in reaching a conclusion:

(1) There are less than half enough colts on farms to replace the horses and mules that die yearly. Substitution of tractors and automobiles for horses and mules must continue, therefore, for several years at least. If a successful cotton picker should be introduced, the process, indeed, might be accelerated. The census for 1930 shows over 900,000 tractors on farms April 1 of that year, a greater increase

between 1925 and 1930 than between 1920 and 1925.

(2) Culling of dairy cows continues, and undoubtedly can continue with advantage for many decades. Likewise sanitation in hog production and the raising of larger litters will doubtless continue. On the other hand, the gains in utilization of feed assignable to slaughter of cattle and sheep at an earlier age, are not likely to be so important in the future as in the past, for nearly all the slaughter now is of young animals. This factor of increasing efficiency in utilization of feed, therefore, is likely to diminish in importance.

(3) There is much less assurance of a continued shift from the crops

less productive per acre toward those more productive per acre.

(4) There is no assurance of continued shift from classes of livestock less productive per unit of feed consumed toward the classes more pro-

ductive per unit of feed consumed.

(5) Crop yields per acre, on the other hand, if the prices of farm products rise and enable farmers to buy fertilizers, should increase in the future. The possibilities inherent in the use of fertilizers, accompanied by abandonment of poorer fields, are illustrated by the upward trend of crop yields in the northern South Atlantic States (North Carolina, Virginia, Maryland, and Delaware) where the increase in average acre yield in the past 30 years has been about 50 per cent. (Fig. 179, top curve.)

#### Soil-Erosion Losses

One other factor deserves consideration, and that is the loss by soil erosion, notably in the South and Southwest. It is estimated by the Bureau of Chemistry and Soils that within 100 years gullying will be well advanced on 100,000,000 acres, unless effective measures of control become widespread. Something like 17,500,000 acres of land formerly cultivated in this country have been destroyed by gullying, or so severely washed that farmers can not afford to attempt their

cultivation or reclamation. Apparently, much of this destruction has

occurred during the last decade.

Erosion appears likely, therefore, to reduce materially during the next decade or two the acreage in crops in many parts of the United States. Looking further into the future it appears inevitable that, unless eroding lands can be restored to pasture or forest, or other effective measures of control are promptly instituted, extensive land abandonment will occur in these areas of severe erosion, involving an increase in tax delinquency, slow impoverishment of the communities, with serious social consequences, and eventual extinction of agriculture in the localities. But the area of potentially arable land in the United States is so great that even the loss of most of the crop land now eroding badly, although of extreme importance locally, probably will not seriously affect the trend of agricultural production for the Nation as a whole. Between 1919 and 1929 over 32,000,000 acres of land, mostly east of the Mississippi River, went out of use for crops without any decrease occurring in the Nation's production because as many acres of former pasture land went into crops, largely in the Great Plains States. Indeed, production increased greatly in that decade, despite the stationary crop acreage, principally because of economies in land requirements resulting from the substitution of mechanical for animal power on farms and the more efficient use of feed by meat and milk animals. There are at present about 360,000,000 acres of land in harvested crops in the United States, but there remain probably 600,000,000 acres more that could be used for crops. Of this 600,000,000 acres about one-half, or 300,000,000 acres, require only to be plowed to be put into crops. Nearly all of this land is in farms.

The population prospect, in view of the advances in agricultural technic, leads to the conclusion that the total farm area of the Nation, and probably the crop area also, are not likely to increase much in the future, unless the immigration restrictions are relaxed or unless exports of farm products increase greatly, but that regional shifts in acreage are almost certain to continue. Much eroding land, much hilly land, much other poor land, will revert to forest, brush, or grass or will lie waste; while much level pasture land, principally in the Great Plains area, will be put into crops, and production per acre probably will increase in many parts of the United States on the more fertile, more level, or more favorably located land already in crops.

O. E. Baker, Bureau of Agricultural Economics.

# NEED OF BETTER DIRECTED LAND SETTLEMENT SHOWN BY MISTAKES OF THE PAST

With approximately 600,000,000 acres of land physically capable of producing crops, but not now so employed, and with an economic need for a comparatively small increase in our net crop acreage the problem of giving direction to agricultural expansion on the basis of the use for which land can best be employed becomes increasingly important.

The agricultural land policy of the Federal Government has consisted in the past, and still consists, largely of making land easily available to the farmer, leaving him free to make his selection, finance the undertaking, and adjust himself to local conditions. Likewise,

with few exceptions, the various States follow the policy of seconding the efforts of private land-selling agencies to attract prospective purchasers of land to the State and of leaving those attracted to the State in the hands of agencies having land for sale. In other words, the traditional public policy in this country has been to promote agricultural expansion without much, if any, regard to the use for which land was best suited, on the general assumption that practically all land which a settler might homestead or purchase was needed for farming purposes. There is now developing a recognition of the desirability of giving better direction to future agricultural expansion—of directing it to those areas having physical and other conditions conducive to the establishment of profitable farming enterprises. Such a program of action will materialize best as part of a more far-reaching program of land utilization.

#### Forces Behind Unwise Expansion

The economic history of agriculture has been marked by recurring cycles in which temporary price stimulus led to unwise expansion of farm acreage on lands physically unsuited for farming purposes and on lands with good physical characteristics not economically needed for agricultural use. Concrete evidences of such misdirected expansion are the financially embarrassed and defunct drainage, irrigation, levee, and other improvement enterprises and large numbers of abandoned farms in many parts of the country. The suffering of many communities because large areas of land have reverted to public ownership through nonpayment of taxes, and because numerous families are waging a hopeless battle against natural and economic disadvantages. are other results of overemphasis on the value of land for farming purposes. It is much easier and requires less stimulus to expand farm acreage than to contract it after homes have been established, farm buildings constructed, and time and labor expended in reclaiming land.

Practically all of the land physically capable of producing crops that is not now so employed is held for sale for farming purposes. A survey of the literature used by 1,258 active land-selling companies in the United States and of their practices revealed the fact that while some of these agencies are doing constructive work of a high character, many are operating in ways not in the public interest. On account of the pressure of carrying charges, many land owners are compelled either to allow their lands to revert to public ownership through tax delinquency or to push the sale of land regardless of its suitability for farming. From the point of view of the owner, to sell land under almost any conditions is better than to lose it through tax delinquency. Either a very small down payment or none is required by most agencies included in the survey. Many agencies also encourage prospective purchasers by promises of various types of grubstakes (lumber, one or more head of livestock, employment, etc.).

Almost half (46.7 per cent) of the 1,258 companies included in the survey are engaged in interstate business and slightly more than half of those engaged in interstate business are conducting so-called home-seeker's tours. The far-reaching nature of this interstate business is suggested by the fact that undeveloped and partly developed land in all parts of the United States is held for sale by the comparatively

few agencies reached in the survey. (Fig. 180.)

The hunger for owning a farm, the high value many people attach to farm ownership, together with the relative ease of purchasing land, particularly undeveloped land; the general ignorance of prospective farm purchasers about obstacles which must be overcome in order to develop a profitable farming enterprise; and misjudgment or misstatement by various types of land-selling and promotional agencies regarding the physical and economic limitations of land for profitable farming, tend to promote agricultural expansion regardless of whether prices for farm crops are, comparatively, high or low.

In times of stress unemployed city families, particularly those who have had previous farming experience, look to the farm for a means of subsistence. Although there are no nation-wide organizations encouraging the movement of unemployed city workers to the country, there are at the present time committees in some cities endeavoring to

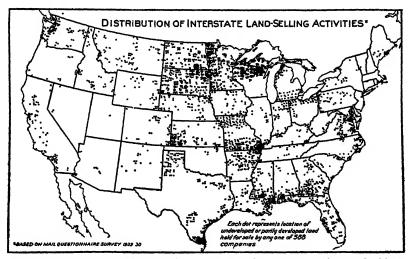


FIGURE 180.—Several land-selling companies endeavor to reach prospective purchasers of land in all but a few States. The majority of companies, however, restrict their activities to some special group of States. All classes of land are held for sake by these agencies, ranging from partix developed farms in what may be considered well-developed agricultural communities to out-over or other undeveloped land remote from any agricultural development

help locate unemployed city workers on farms. A large number of jobless families have undoubtedly moved to the country as potential farm owners, regardless of the fact that well-established farmers are experiencing difficulty in maintaining a satisfactory standard of living. Without advice having a sound factual basis many of these new farm families are doomed from the start to failure. Undirected and misdirected settlement has in times past resulted in the loss of economic and human resources, and the chances for loss to-day are as great or greater than ever, because of the limited need for increasing our net crop acreage.

## Agricultural Expansion Service Agency

No existing public or private agency has adequate information or necessary authority and facilities to furnish prospective farmers, landselling agencies, various business interests, and other public agencies concerned with the farmer's welfare, sound advice on social and economic justification for agricultural expansion in the different regions of the United States. There appears to be need for a service agency to supply unbiased information on the physical and economic adaptability of various classes of land for agricultural development, and thereby to reduce the loss of economic and human resources resulting from attempts to establish farms on lands submarginal for farming purposes. A coordination of the facilities and authority of Federal. State, and even county agencies would be desirable. A central agency of this character could help land-selling companies to develop sound programs for expanding the agricultural area when economically feasible. It could also list and certify developed and partly developed farms for sale or rent and in other ways could be of valuable service to present and prospective landowners, as well as to the public in general. With such an agency developing its program on the basis of careful analysis of the comparative advantages for agricultural development along one or more lines in the competing areas of the United States, many of the difficulties of giving better direction to agricultural expansion will have been overcome.

W. A. HARTMAN, Bureau of Agricultural Economics.

# CROPS OCCUPY NEARLY HALF THE CULTIVABLE ACREAGE OF THE UNITED STATES

Of the estimated area of 973,000,000 acres physically capable of use for crops in the United States, 414,000,000 acres or approximately 43 per cent consisted of crop land (land in harvested crops and crop land lying idle or fallow) in 1930. The remaining arable land not used for crops is, on the whole, of lower natural productivity and utility than the crop land now in use. A part, however, is inherently much more productive than some land now used for crops, but in most instances of uncultivated fertile areas, the necessity of draining or clearing has hindered their development, and their inherent productivity may not at present justify the cost of bringing them into production. The marked diversity in quality of the uncultivated potential crop land and the prevalence of low-grade land with poor soil or hilly surface indicate the desirability of competent economic determination of the best use of the land before it is brought under cultivation.

Although the land now used for crops is, on the whole, of better grade than the arable lands not used for crops, considerable bodies of land now cultivated are of such poor quality that they apparently can not provide even a fair living to the operators. In some sections the attempt to farm such land has resulted from the failure to evaluate its

capabilities before its development was attempted.

Nearly all the land physically suitable for growing crops is now in private ownership. The unreserved public domain contains little land of value for crop production, mainly because of aridity. Some of our uncultivated arable land consists of pasture or woodland on farms, while some consists of timberland or grazing-land holdings.

If the crop area were expanded to include all land on which crop production is possible, which is altogether unlikely, there would still remain close to 800,000,000 acres available for pasture, about 330,000,000 of which might be used for forest. In 1930 there were approximately 1,350,000,000 acres not used for crops, that could provide

grazing of some sort, but a large part, probably more than four-fifths, was already used for grazing. Any large increase in the land used for pasture will be in the fore-ted or cut-over area. Of the area of forest land of approximately 500,000,000 acres, it has been estimated that there are about 355,000,000 acres suitable only for forest. Under more intensive methods of forest management it is possible that our total requirements for forest products could be supplied from an area equal to that of the land suitable only for forest.

### Small Need for More Crop Land

It is believed by those studying the trend of population and food requirements that little increase in the land used for crops will be

needed for many years. (Fig. 181.)

The problems of land utilization are, therefore, less concerned with developing more land to use for crops, than with determining what lands it will be better to use for farming than for some other use under the economic conditions prevailing at any given time, and of coordinating the use of land resources so as to benefit the greatest number of individuals over the longest period of time. In some instances it may involve a change in the use of some land from crop production to some other major use, where the present use seems economically unsound.

The problems involved in the use of farm-land resources have various regional aspects, because of the regional distribution of such resources, and they require regional inventory of resources for intelligent

solution.

The broad major rural land-use regions correspond to the great moisture belts. Thus, only in the humid regions does forest constitute an alternative major use. In a large part of the dry Southwest, grazing is the only use where irrigation water is not available. In the Great Plains and probably on the central prairies, crop land and pasture con-

stitute the only feasible major alternative uses.

The humid and subhumid lands of the tall-grass prairies of the Central States are, on the whole, our most productive farm lands, having both favorable topography and naturally fertile soils. Together with the productive, originally timbered lands of the eastern Corn Belt, they are almost all in farms and are likely to remain so. A very large part of the farm area is in crops, and there can be relatively little increase in crop land without a change in the farm organization.

## Problem in Areas of Low Rainfall

In the semiarid and subhumid short-grass plains, however, low rainfall reduces the productivity of inherently fertile soils. The moister lands with smooth surface, where large-scale methods can be used to produce crops at low cost, are very largely in farms, and these are mostly in crops. In the drier parts of this belt there are large areas of physically tillable land on which the yield is so unreliable that crop production is rarely profitable. In addition there are extensive areas in the Great Plains with surface so broken as to be essentially nontillable. Since the Great Plains are treeless, arable land there can be plowed without the cost of clearing. On the arid lands of the West, also treeless, rainfall is as a rule too slight for dry farming. Here,

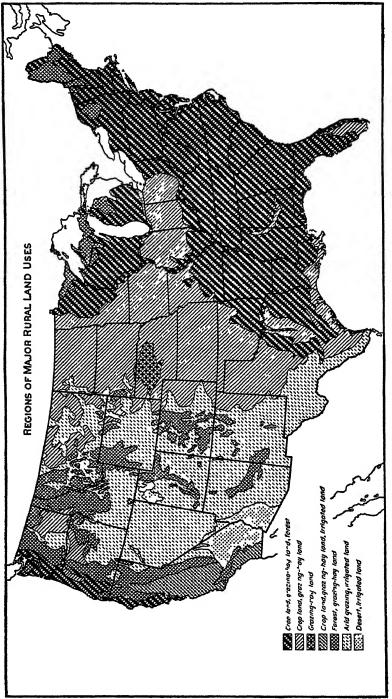


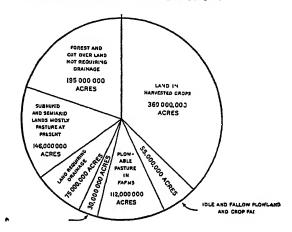
FIGURE 181,—Map showing locations in which different uses of land predominate

except for irrigable areas, the land finds its chief use in furnishing grazing for livestock. It is estimated that, in addition to the land now irrigated, there are 30,000,000 acres potentially irrigable in the arid part of the country. The cost of applying irrigation to most of this would undoubtedly be large, as the most easily irrigable lands have already been utilized.

The great humid forested regions contain large areas of land of various grades of natural productivity, physically capable of crop production. Included within the humid forest regions are a few natural grassland areas not now used for crops, of very favorable topography, but for the most part requiring drainage. Except for

certain specialized crops these areas have soils of relatively low or doubtful productivity. Noteworthy among such lands are the great saw-grass swamps or Everglades and the poorly drained prairies or savannas of southern Florida. The uncultivated, poorly drained land with light-colored soils in the coast prairies of Texas and Louisiana are of moderate to low productivity when drained, although the poorly drained

#### LAND CAPABLE OF USE FOR CROPS



EXTREME PHYSICAL POSSIBILITY, 973,000,000 ACRES
FIGURE 182.—Diagram showing proportion of land which is or can
be used for crops, under different conditions

dark-colored lands of the coast prairies, much of which is used for extensive grazing, are inherently productive. (Fig. 182.)

#### Atlantic and Gulf Coastal Plains

In the Atlantic and Gulf coastal plains are immense areas of forest land with level or gently rolling surface. In large part these are sandy lands. A considerable portion is poorly drained. Further drainage and clearing will be required before this land can be brought into production. Although some of these lands are undoubtedly as productive as a part of those now used for crops, the cost of reclamation and the relatively limited demand for the crops to which they are peculiarly adapted has deterred the clearing of large areas.

In the forested and cut-over country of the northern Lake States, there are large areas of favorable topography, part of which have relatively productive soils, still unused for crops. The short season and low temperatures here limit the range of crops that can successfully be produced. A part of these lands is deficient in drainage, and nearly all must be cleared. In the same region, and rather intimately associated with the more productive lands, are sandy and stony lands

of rather low natural productivity. In bringing new land into use, care must be exercised that the better lands be distinguished from the poorer and settlement guided accordingly. Inventory of soil resources

is being carried on in the region to this end.

In northern Maine there are limited areas of productive soil at present densely forested. In the humid forested region of the Pacific Northwest are considerable areas of cultivable land now largely densely forested or covered with stumps, where costs of clearing are very high. Some of this land is moderately productive, while a part is hilly and a part is low in productivity.

### Uncultivated Land in Humid Forest Region

Although the most productive lands in the humid forest region are, in general, used for crops, this region now contains the largest amount of uncultivated, potentially arable land, the quality of which ranges from high to very low. The wide range in quality necessitates careful discrimination in selecting lands for farming and indicates the desirability of land inventory and the economic classification of land. Particularly in the hilly and stony sections, considerable land is in farms and in cultivated crops, whereas its most advantageous use is probably something other than crop production. Gradual abandonment of such land and its reversion to forest have been taking place. It is probable that eventually there will be some substitution of the better grade lands not now used for crops, for the poorer lands now so used.

There is, further, some reduction in the area of productive farm lands taking place through loss of soil by erosion, both in the humid forest regions and in the subhumid and semiarid grasslands. Gradually a part of the land now in pasture or forest probably will be used to replace some of that land the productivity of which is reduced by

erosion or depletion of fertility.

The problems involving the use of land resources are mainly those of wise selection; they require inventory, classification of land according to its most advantageous use, and intelligent planning.

C. P. Barnes and F. J. Marschner, Bureau of Agricultural Economics.

# AVERAGE VALUE PER ACRE OF FARM REAL ESTATE IN UNITED STATES WAS \$48.52 IN 1930

The average value per acre of farm real estate on April 1, 1930, for the United States as a whole was reported by the Bureau of the Census to be \$48.52. Considerable variation appears in different regions, as a result of varying combinations of physical and economic factors, and several more or less distinct groups of States may be distinguished.

(Fig. 183.)

The States reporting the highest acre values are New Jersey, Connecticut, and Massachusetts. These high values reflect the effects of nearness to a concentrated market, and of an ever-expanding demand for locations for suburban homes by increasing numbers of city workers. A more extensive area, where values on the average are somewhat lower, although still appreciably above the United States average, embraces the fertile agricultural area commonly known as the Corn

Belt, and also includes the several States bordering the Great Lakes. The farm lands in this area derive their value principally from their adaptability to agricultural production, although, it is true, certain acceptable border important industrial and acceptable in the second control of the second control

sections border important industrial and commercial areas.

Farther to the west and southwest are the highly variable land areas of the Mountain and Pacific States. Values range from almost nominal amounts for the poorer-quality grazing lands to several thousands of dollars per acre for lands planted to subtropical fruits. In considering an area so heterogeneous it is easy to understand the high variability between the different State averages, which tend, on the whole, to be lower than the United States average because of the relatively large areas of low-priced land. California and Washington, however, are conspicuous for higher averages, by reason of considerable areas of high-priced lands.

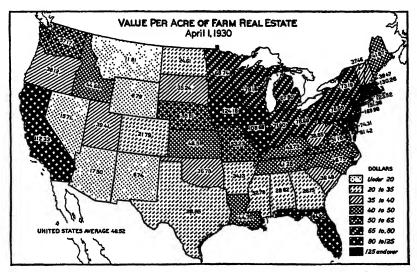


FIGURE 183.—Several generalized areas in the United States may be distinguished on the basis of average value per acre of farm real estate. A few States along the North Atlantic coast report high average values; the Uorn Belt and States bordering the Great Lakes constitute a group in which average values, though somewhat lower in general, are appreciably higher than the United States average; the widely varying values in the Rocky Mountain and Pacific States provide many contrasts; and the cotton States bordering the Gulf of Mevico provide a group in which State average values reported are generally lower than the United States average

The States bordering the Gulf of Mexico, with their great dependence on cotton, average somewhat below the United States average, with the exception of Florida, where the combination of subtropical products and proximity to residential and recreational properties results

in a rather high average.

The general relations described above mark the levels of land values in 1930, a decade after 1920, when farm lands for the country taken as a whole reached peak prices. The deflation in the last decade has been exceedingly varied in its effect upon farm real estate in the different agricultural areas. For the country as a whole, the per acre value of farm land and buildings was 30 per cent less in 1930 than in 1920, and by far the great majority of the States report farm real estate values much below those of 1920. Declines in value per acre of farm real estate in the Corn Belt and in the grain-growing areas to the Northwest

and Southwest were very severe. (Fig. 184.) The States in the Cotton Belt, with the exception of South Carolina and Georgia, reported smaller percentage decreases, and one State, Alabama, reported an increase. The Mountain States also reported declines, which, however, showed pronounced variation. Two Pacific Coast States reported declines less than the United States average and the third. California, reported a 7 per cent increase in average value.

## Significance of New England Trend

In the New England and Middle Atlantic States the general trend in value of land and buildings as indicated by the State averages appears to have been upward. That this upward trend reflects a correspond-

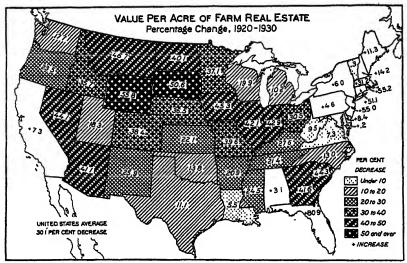


Figure 184.—For the United States as a whole, the average value per acre of farm real estate was 30 per cent lower in 1830 than in 1920. Regional changes in values have been far from uniform. The increases indicated by the State averages in several of the North Atlantic States are in contrast to the marked decreases throughout most of the Middle West, the Far West, and substantial portions of the Nouth. State averages do not tell the whole story, however. In Now York and Pennsylvania, for example, the greatest increases are, in general, in the eastern portions; many of the western counties in these States report decreases in value

ing degree of agricultural prosperity in these areas is doubtful, however. It appears more likely that the effects of encroaching suburban developments and recreational uses have resulted in an increased valuation in certain areas more than sufficient to counterbalance declining, or at least more slowly rising, values in some of the strictly agricultural portions of these States. Examples are found in the large increases reported in eastern and southeastern New York, as well as in eastern Pennsylvania and in New Jersey, in contrast to the declines reported in many of the counties in western New York and western Pennsylvania.

It is significant that the States reporting an increase in value per acre from 1920 to 1930 reported an aggregate increase in value of land and buildings amounting to \$270,085,573 accompanied by a decrease of land in farms of 10,286,165 acres. The decrease of land in farms probably represents some degree of farm abandonment or the transition

to forest of part of the less valuable land, together with the absorption of other areas by expanding suburban districts and by various types of recreational usage, especially in parts of New England and New York. The States reporting decreased value per acre, on the other hand, reported an aggregate decrease in value of land and buildings of \$18,707,816,160, and an increase in land in farms of 41,176,063 acres. The net decrease in value of farm land and buildings in the entire United States (excluding the District of Columbia) was \$18,437,730,587.

#### Valuation of Buildings

It will be noted that the changes reported in value per acre of farm real estate relate to value of land and buildings combined. (Fig. 184.) That a considerable part of these increases in value per acre is due to

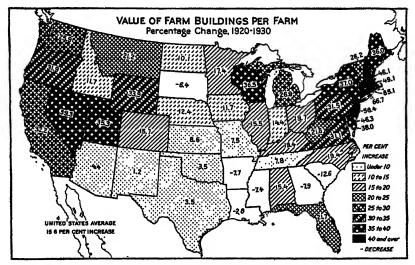


FIGURE 185.—That a substantial part of the reported increases in value per acre of farm real estate (land and buildings combined) is due to reported increases in value of buildings is indicated on the accompanying map. Several New England and Middle Atlantic States, where increases in value per acre appeared, report increases of 30 per cent or more in value of buildings per farm, in contrast not only to the smaller relative increases reported from many of the North Central and Southwestern States, but also to the decreases reported by several of the Southern States

increased value of buildings, rather than of land alone, is suggested in Figure 185, in which the percentage changes in value of farm buildings per farm from 1920 to 1930 are presented. The average increase for the United States as a whole is 15.6 per cent. The greatest percentage increases are found, in general, in the group of States with both the highest average value per acre of farm real estate, and with the greatest average percentage increases in value per acre during the decade 1920–1930, namely, the southern New England and Middle Atlantic States. Most of the Mid-Western States (Ohio to Kansas and North Dakota) report increases of less than 20 per cent, except Wisconsin and Michigan, where, it will be noticed, smaller percentage decreases in value per acre of land and buildings occurred than in the neighboring States. Several Southern States reported decreases in value of farm buildings per farm, notably Georgia and South Carolina, where, as indicated above, exceptionally large percentage decreases occurred in

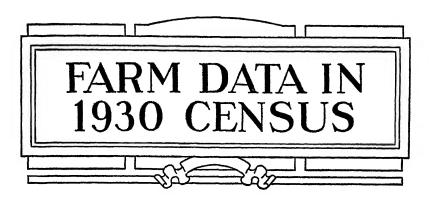
value per acre of farm real estate. Alabama, on the other hand, reported a 15 per cent increase in value of buildings per farm, as well as

a 3 per cent increase in value per acre of farm real estate.

These trends apparently are related. There is reason to believe that some buildings were included in value of farm buildings, as reported by the 1930 census, that were not included in previous census enumerations. This situation may have arisen as a result of a new inquiry in the census schedule as to value of farmers' dwellings, plantation owners' homes presumably having been included in many cases in 1930, whereas they may previously have been omitted.

On the whole, the result of 10 years of readjustment has brought about a marked reduction in value of farm real estate in a preponderance of the typically agricultural areas. Generally speaking, however, farm realty values in New England, along the Atlantic coast (with a few exceptions), and through the cotton States are higher than in 1910; in parts of the Corn Belt and of the spring-wheat belt values are lower; while in the Mountain and Pacific States the situation is spotted. The extent of the declines from 1920 depends upon a variety of factors which center around the extent to which values in the various areas were inflated in 1920, and in the changes which have occurred in income from agriculture during the past decade.

B. R. STAUBER, Bureau of Agricultural Economics.



# REGIONAL SHIFTS IN CROP ACREAGE SHOWN BY CENSUS HAVE BEEN EXTENSIVE

Despite the agricultural depression, the acreage of crops harvested in the United States as a whole increased materially between the years 1924 and 1929, but in 1931 most of the gain was lost. The census returns recently issued confirm the estimates of the United States Department of Agriculture that an increase of at least 9,000,000 acres occurred between 1924 and 1929; in fact, the census returns indicate an increase of nearly 15,000,000 acres. This discrepancy in figures probably is owing mostly to the fact that the 1925 Census of Agriculture was unaccompanied by a census of population and, therefore, may be less complete than the census of 1920 and that of 1930, which covered

crop acreages of 1919 and 1929.

Crop land harvested in 1924 totaled 344,549,267 acres, according to the census, and 359,242,091 acres in 1929, which is an increase of 4 per cent. The crop acreage in 1929 had returned to the 1919 peak, and was, apparently, a little larger than ever before in the Nation's history. In 1930 the area of crops harvested increased another 2,000,000 acres, according to the estimates of the Department of Agriculture, but in 1931 a decrease of over 9,000,000 occurred—the greatest decrease on record, but almost confined to the Dakotas and Montana where severe drought occurred. Total acreage of crops harvested in 1931 was smaller than in any year since 1917, except 1924. It is significant that the total crop acreage of the Nation as a whole has remained more or less stationary for 15 years, despite an increase of 23,000,000 in population, or about 23 per cent. But this stationary national total is the result of great increases in acreage in certain portions of the Nation and of great decreases in other portions.

## Regions of Decrease in Crop Land

The census statistics are tabulated by counties, and maps showing the decrease and increase in crop area between 1924 and 1929 reveal significant regional shifts in acreage. (Figs. 186 and 187.) The decrease in acreage of crops harvested has taken place mostly in a belt which includes nearly all of New England, every county in New York, every county in New Jersey except one, and in Pennsylvania, except three, all counties of eastern Ohio, and nearly all counties in the southern peninsula of Michigan; thence the decrease extends south-

westerly, including nearly every county in southern Indiana and in southern Illinois, also most counties of Missouri, all of southeastern Kansas and the northwestern half of Arkansas, practically all the eastern half of Oklahoma and most counties in central Texas. The decrease in the Chicago district really forms part of this 2,000-mile belt that extends from the Canadian border in Maine to the Mexican border in Texas.

Southeast of this belt less notable accreases in crop acreage occurred in most counties of Tennessee and South Carolina, also in about half the counties of Florida, Georgia, North Carolina, Virginia, West Virginia, and Kentucky and in more than half the counties of Maryland and Delaware. Georgia, South Carolina, Kentucky, and to a less extent all the Southern States, except Texas, suffered drastic declines in crop acreage during the previous 5-year period, 1919–1924, and a

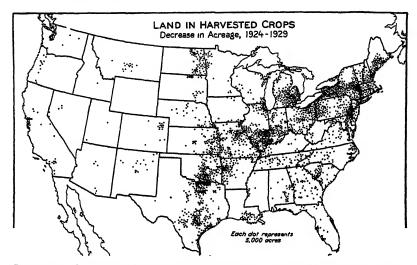


Figure 186.—The decrease of land in harvested crops between 1924 and 1929 occurred principally in a belt that extended from New England across New York and Pennsylvania, eastern Ohio and southern Michigan, southern Indiana and Illinois, to eastern Oklahoma and central Texas

recovery in some of the counties of this region was to be expected. (Fig. 188). In most of Indiana, Ohio, and southern Michigan, however, crop acreage also declined greatly between 1919 and 1924, and this decline has continued into the period 1924–1929. On the other hand, in New England and New York crop acreage declined little between 1919 and 1924 and in many counties increased. (Fig. 189.)

Minor areas of decrease in crop acreage between 1924 and 1929 are the "sugar bowl" of southeastern Louisiana, the eastern third of North Dakota and adjacent counties in northwestern Minnesota, the upper Yellowstone and Musselshell Valleys in Montana, western Oregon, and northern New Mexico. (Fig. 186.)

## Regions of Increase in Crop Land

In nearly all other parts of the United States an increase in crop acreage occurred. (Fig. 187.) This increase was notable in the Great Plains area that extends from west-central Texas to the Canadian

border and beyond. Particularly heavy was the increase in the Panhandle of Texas and in the western parts of Oklahoma, Kansas, Nebraska, South Dakota, and North Dakota, also in northeastern

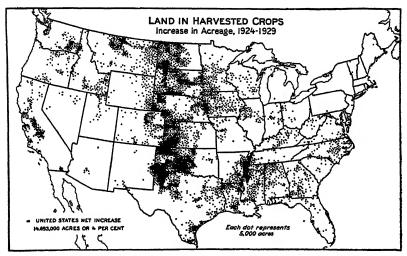


FIGURE 187.—The increase of land in harvested crops between 1924 and 1929, principally in the Great Plains area, Minnesota and Iowa, and in the Yazoo-Mississippi Delta, extending eastward into Alabama, exceeded the decrease in area by nearly 15,000,000 acres. (Fig. 186)

Montana and the Great Falls-Havre-Shelby triangle. This belt of increase, less heavy, extended eastward across Iowa and most of Minnesota into Wisconsin and central Illinois.

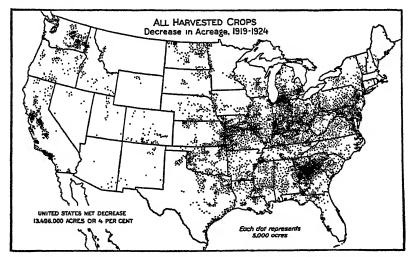


FIGURE 188.—In the period immediately following the World War, 1919–1924, the decrease in acreage of harvested crops was most notable in Kentucky, Ohio, Indiana, and southern Michigan, in central Missouri, and in the pledmont of Georgia and South Carolina. This decrease exceeded the increase, mostly in the Great Plains area, by about 13,500,000 acres

Smaller increases occurred in nearly all the counties from the Great Plains to the Pacific Ocean, except in northern New Mexico, western Oregon and several dominantly urban counties of California. Three areas of increase in crop acreage in the East also deserve notice: (1) The Mississippi River bottom lands from Missouri southward to the sugar-growing parishes of Louisiana, and also the coastal-prairie rice district. Reaction from the decline in crop acreage after the World War appears to have spread from these Mississippi River bottoms eastward almost to Georgia and westward into eastern Texas. (2) The southern tip of Texas, notably around Corpus Christi. (3) The coastal plain of eastern North Carolina and southeastern Vir-

(3) The coastal plain of eastern North Carolina and southeastern Virginia. This increase is attributable, in part, to the fairly favorable

prices for cotton prior to 1929.

In Figure 190 the decrease and increase in the decade 1919-1929 is shown by States. It will be noted that crop acreage decreased in every State east of the Mississippi River, except Mississippi, while in all the States west of that river crop acreage increased, except in

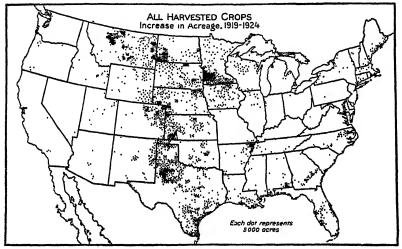


FIGURE 189.—The increase in acreage of harvested crops between 1919 and 1924 was almost confined to the Great Plains area, southern Minnesota and southern Texas, with a small area of recently drained land put into crops in southeastern Missouri and adjacent Arkansas

Missouri, Arkansas, and the three Pacific Coast States. When the decreases are tabulated for all the counties in which a decrease occurred, nearly all located in the originally forested portions of the United States, it appears that over 32,000,000 acres of land that were in crops harvested in 1919 lay idle in 1929, or were used for pasture, or were growing up to forest; while 33,000,000 acres, mostly in the originally grassland portions of the Nation, that were used largely for grazing in 1919, had been plowed and put into crops by 1929.

## Conditions Associated With Changes in Crop Land

Viewing the United States as a whole, a few conditions appear to be associated with most of these notable decreases and increases in crop acreage. The decreases have occurred principally in areas:

(1) Where the soil was rather poor to begin with, or where sale of crops and animal products for many years without use of fertilizers has resulted in depletion of soil fertility, or where cultivation of sloping land has caused loss of fertility by erosion. Of these factors probably erosion is the most important.

(2) Where the surface of the land is too hilly or stony, or where the farms are too small to permit the efficient use of modern

machinery.

(3) Where industrial or commercial opportunities in near-by cities have attracted the young people from the farms, or where suburban development has transformed farms into residential sites, golf courses, or idle land.

The large increase in crop acreage in the Great Plains area has occurred mostly in areas having—(1) fertile, virgin, grassland soils, unleached by heavy rainfall, and productive in seasons of normal and supernormal rainfall; also practically uninjured by erosion, owing largely to previous vegetation cover; (2) almost level land adapted to use of large-scale machinery; and (3) farms large enough to afford opportunities normally commensurate with those in the cities.

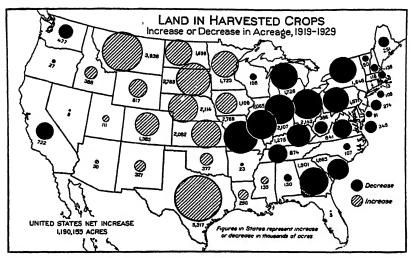


FIGURE 190.—Considering the regional changes in crop acreage for the decade 1919 to 1928 as a whole, and by States only, it appears that in every State east of the Mississippi River, except Mississippi, a decrease occurred; while in every State west of that river, except Missouri, Arkansas, and the Pacific Coast States, an increased occurred. The decrease was notable in the States extending from New York to Missouri, also in Georgia and South Carolina, while increase was equally notable in the Great Plains area, extending from Texas to Montana, also in Minnesota, and, to a lesser extent, in Iowa

Some of these factors also help to explain the increase in crop acreage in the Mississippi River bottoms and in many of the valleys of the 11 Western States.

It is evident that progress in the use of the tractor, the combine, and other large-scale machinery in the West has continued to promote expansion of crop acreage and this has continued to exert a depressing effect upon eastern agriculture. Since the census was taken this depression, owing to the great fall in prices of farm products, has extended in severe form into the West also, and it seems not unlikely that, if present unfavorable conditions continue, the expansion of crop acreage in the Great Plains and other western areas will slow up, possibly cease entirely, for a while. But contraction in acreage in the West, as in much of the East, will come slowly, if at all, because the farmer has the equipment and labor to operate the land, and taxes and interest payments have to be made.

O. E. BAKER, Bureau of Agricultural Economics.

# REGIONAL SHIFTS LARGE IN MAJOR CROP ACREAGES DURING DECADE 1919–1929

The decade 1919 to 1929 witnessed a decline in crop acreage in the area lying east of the Mississippi River, which was more than offset by an increase west of that river. Much of the decline east of the river resulted from abandonment of farms or conversion of farm land to urban or semiurban use. A further cause of decline was the replacement of low-yielding acreages, particularly hay, by smaller acreages of higher-yielding crops or kinds of hay. Much of the increase west of the river resulted from the breaking up of new lands in the semihumid portions of the Great Plams States for cultivation under more modernized machine methods. A portion of the increase must also be attributed to the difference in the two crop seasons. In 1919, a severe drought over much of the western portion caused a heavy

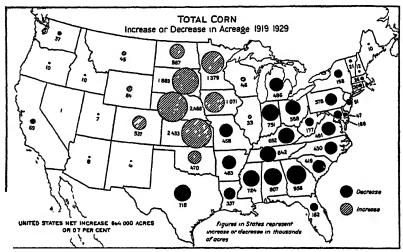


FIGURE 191 -Reductions in corn acreages cast of the Mississippi River from 1919 to 1929 were slightly more than offset by increases west of the river, where corn and look, displaced much war-time whe it.

abandonment of crops. In 1929, on the other hand, a favorable growing season was accompanied by less than average abandonment. Certain regional changes in individual crop acreage result from readjustments of price levels. The year 1919 followed a year of very high prices for cash crops, while 1929 followed a year of relatively low

prices.

The acreage of corn in the United States in 1929 was larger than the acreage in 1919 by about 664,000 acres, or 0.7 per cent. The exact change can not be determined, since in the census for 1929 acreage of corn for all purposes was enumerated, while in the census for 1919 the separate acreage of corn "for grain" and "for forage," and of all crops "for silage" and "for grazing" were enumerated. The extent of possible duplication can not be accurately determined. It can readily be seen from Figure 191, however, that a general decrease in acreage occurred east of the Mississippi River and in Missouri. Arkansas, Louisiana, and Texas. A very pronounced increase from Minnesota and North Dakota south to Kansas and Colorado took

place. The decline in corn acreage east of the Mississippi River was coincident with the general decline in crop acreages in this area. The expansion west of the river accompanied the expansion of the hog industry in that area, particularly in the more humid sections of these States, which are adapted to corn growing. In Iowa, the southern portion of Minnesota, and the eastern portions of South Dakota, Nebraska, and Kansas, wheat acreage was greatly expanded under war-time stimulus. Since 1919 corn and hogs have been more profitable under relative price conditions than has the growing of wheat. (Fig. 191.)

Wheat acreage in 1919 was still on a high plane brought about by war-time stimulus. By 1929 the acreage in the United States had decreased by over 11,000,000 acres. East of the Mississippi River and in Missouri, where total crop acreage declined, wheat acreage in addition returned to a normal proportion of the total crop acreage.

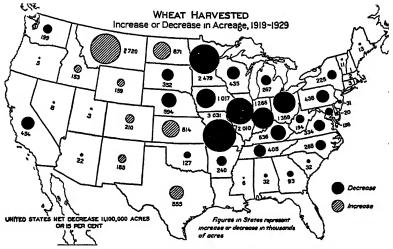


FIGURE 192—Between 1919 and 1929 wheat acreage from Missouri eastward returned toward its normal proportion of the cropped acreage, from eastern Kansas northward it was partially displaced by corn and barley, and from western Texas and New Mexico northward, new lands were opened up for wheat growing

In Iowa and the southern portion of Minnesota and in the eastern portions of South Dakota, Nebraska, and Kansas, wheat acreage was displaced by corn, as mentioned in the preceding paragraph, and also by barley. In the western parts of the Dakotas, Nebraska, Oklahoma, and Kansas, and in the Mountain States from Montana to New Mexico, new land was broken up for wheat growing as a result of large-scale farming with tractors and combines. A part of the increase in North Dakota and Montana represents also a recovery from the extensive abandonment of wheat in 1919. (Fig. 192.)

The census data on cotton acreage show an increase of 9,500,000 acres or 28 per cent, from 1919 to 1929. Decreases shown in Georgia and South Carolina result from the precipitous decline in cotton acreage following three years of heavy loss from boll-weevil damage in 1921–1923. As a result of the short crops in these years, cotton was displaced in some parts by peanuts and other legumes, and in some parts farm land went out of cultivation entirely. In these States, acreage had not

returned to pre-weevil levels by 1929. In Alabama and parts of Mississippi, Louisiana, Arkansas, and Texas, acreages in 1919 were on a low level because of a series of weevil-damaged crops in 1916–1918. The increase to 1929 in this area represents a partial return to former acreage levels. In the Delta portions of Arkansas, Louisiana, and Mississippi, an upward trend in Delta cotton land has gone forward during the decade with new Delta land broken for cotton or diverted from corn and other crops. In Oklahoma and Texas the tremendous increase in acreage has come largely since 1924 in southwestern Oklahoma and northwestern Texas, where cotton is now produced on semihumid lands formerly in range and considered unproductive of this or any other cultivated crop. (Fig. 193.)

Oat acreage for grain declined over 1,000,000 acres or about 11 per cent, from 1919 to 1929. The decrease was rather general throughout

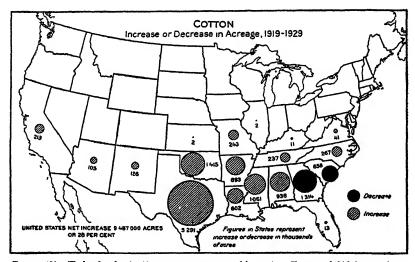


FIGURE 193 —Higher levels of cotton acreage now prevail in western Texas and Oklahoma where ranges were broken up, and in the Delta of the Mississippi River where high yields per acre are obtained. Lower levels prevail in Georgia and South Carolina where heavy weevil damings in 1921–1923 drove farmers out of cotton.

the country, except in Minnesota, Iowa, and Nebraska, where substantial increases were made. The decreased acreage reflects decreased work-stock numbers. In the Minnesota-Iowa-Nebraska area, oats are another feed crop increased with the increasing livestock industry in these States. A part of the decrease in acreage harvested for grain is offset by an increased use of oats as "bundle" feed and as a part of "mixed grain," the exact change in acreage of which is not determinable from census data.

## Increase in Barley Acreage

Barley acreage in the United States increased over 6,000,000 acres or nearly 100 per cent, during the decade. The increase has been general except in the Northeast, and has been particularly marked from Illinois and Wisconsin westward to Idaho and southwestward to northwestern Texas and Colorado. Many States in this area doubled or even quadrupled the acreage of barley. The regional shift has been

away from wheat and oats and is another phase of the expansion of the hog industry westward from the Mississippi River.

The acreage of rye declined from a war-time peak of over 7,600,000 acres to 3,000,000 in 1929. The decrease was general, but was most marked in New York and Michigan where the reduction was over 80 per cent and in North Dakota where it was over 60 per cent.

The acreage of tame hay in the United States decreased from 55,600,000 to 54,300,000, or about 3 per cent. The decrease in acreage has been more than offset by shifts to higher-yielding kinds like alfalfa. The North Atlantic and Southern States, Ohio, and Indiana are producing less hay, while the States growing in importance in dairying, beef cattle, and sheep production, from Michigan west to Montana and southwestward to California are increasing hay production. Cultural difficulties in the production of alfalfa have led to a severe downward trend in hay acreage in Nebraska and Kansas.

The decrease in the acreage of wild hay during the decade, from 17,000,000 acres to 13,500,000 acres, reflects the breaking up of land in the Great Plains States for the growing of wheat, flax, and barley, and also the further draining of lowlands in a number of the North

Central States.

Joseph A. Becker, Bureau of Agricultural Economics.

## FARMS FEWER BUT LARGER IN 1930 THAN IN 1920; CROP AREA PER FARM INCREASED

Changes in total numbers of farms reflect only to a minor extent the severe competition in farming that prevailed throughout the decade 1920–1930. There were 6,288,648 farms in 1930, according to the census, as compared with 6,448,343 farms in 1920. This is a decrease of less than 3 per cent. The amount of land in farms, 986,771,016 acres, in 1930 was approximately 31,000,000 acres more than the 1920 figure. The average size of farms increased to 157 acres in 1930 from 148 acres in 1920. Land in crops harvested averaged 57 acres per farm in 1929 and 56 acres in 1919.

Decreases in numbers of eastern farms were widespread partly because production per man is generally less in the East than on the larger, more level, and frequently more fertile farms of the West; also because of the relative nearness of eastern farms to urban centers of employment. (Fig. 194.) Indeed, the number of farms decreased in all States east of the Mississippi River, except North Carolina, Florida, Alabama, and Mississippi, but west of that river decreased only in Missouri, Montana, and Idaho. In all of the New England States, in New York, New Jersey, Pennsylvania, Ohio, Indiana, Michigan, Montana, South Carolina, and Georgia, numbers of farms decreased over 10 per cent between 1920 and 1930.

Decreases in numbers of Montana farms were sharp, following a number of years of drought so severe as to convince many newly settled farmers that they had been mistaken about the climate and the amount of land and capital required to farm in that State. Much of the land they left is now consolidated into larger farms so handled as to increase the production per man and to improve the competitive position of

the remaining farmers.

In extensive areas in South Carolina and Georgia, particularly in the lower piedmont of those States, boll-weevil damage and other factors made cotton farming very hazardous, and forced many farmers to seek a living elsewhere. Much of the land they left is no longer farmed. Many of the 228 counties of the United States in which numbers of farms decreased 25 per cent or more between 1920 and 1930 are in these two States. Montana and the New England States have many others, but only a few of these counties of large decrease are in the central part of the country. In three piedmont counties of Georgia there were less than half as many farms in 1930 as there were in 1920. Most of the other 16 counties with less than half as many farms in 1930 are near large cities or contain them.

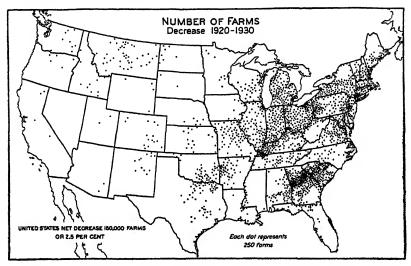


FIGURE 194.—The decrease in number of farms was notable in South Carolina, Georgia, and eastern Alabama, where much land went out of use for farming. A smaller decreuse may be noted quite generally over the New England, Middle Atlantic, and East North Central States. There has been a trend toward consolidation of farms in the eastern Corn Belt and in the northern Plains. This trend was added in Montana by several dry years which forced many recent homesteaders to leave their farms. The decrease in number of farms was greater than the increase, the net decrease for the United States being 160,000, or 2.5 per cent

#### The Western Cotton Area

Cotton production has been less hazardous and the morale of cotton farmers has been better maintained in the remaining cotton States, resulting in generally increased acreages of crops and in numbers of farmers. (Fig. 195.) The feasibility of cotton production in western Texas became widely appreciated, resulting in a phenomenal increase in numbers of farms there. South Texas, along with Florida and California, also gained greatly in numbers of farms as a result of the widened market for fresh fruits and vegetables. Of the 314 counties of the United States in which the number of farms in 1930 was greater than the number in 1920 by 25 per cent or more, 109 are Texas counties. Of the 45 counties in the country in which numbers of farms at least doubled, 34 are Texas counties.

Numbers of farms increased 10 per cent or more between 1920 and 1930 only in Arizona, Louisiana, California, Mississippi, and Texas, named in order of the percentage increase in each. Four of these five

States outranked all others in gains in numbers of farms. Between 1920 and 1930 Texas gained 59,456 farms, Mississippi 40,562, Louisiana 25,982, and California 18,006 farms.

### Changes in Numbers of Farms by Size

Decreases in numbers of farms have been most general in a size group long regarded as somewhat ideal, farms of 100 to 174 acres, and increases in numbers have been most general in a size group long regarded as too small to provide a livelihood—farms of less than 3 acres. (Fig. 196.)

The number of farms under 3 acres more than doubled between 1920 and 1930, but even in 1930 these were less than 1 per cent of the total number of farms. Farms under 20 acres in size constituted 12 per cent of all farms in 1920 and 15 per cent of all farms in 1930. Farms on which cotton is grown are, in general, relatively small, and changes in cotton acreages have a marked effect on numbers of farms, particularly

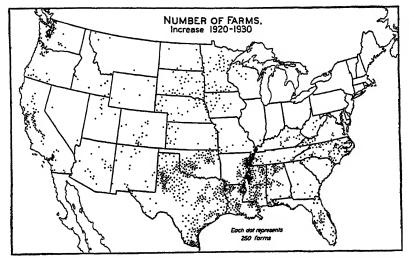


FIGURE 195.—The increase in number of farms between 1920 and 1930 occurred principally in the central and western portions of the Cotton Belt, in North Carolina, in central Florida, in Minnesota, and South Dakota, and in the valleys of the Pacific coast region

numbers of farms of the smaller sizes. The five cotton-growing States of Mississippi, Arkansas, Louisiana, Oklahoma, and Texas between them had about 83,000 more farms under 20 acres in size in 1930 than they had in 1920. The increase in numbers of farms of this size was about 120,000 for the country as a whole.

## Changes in Five Size Groups

The great bulk of the farms of the country, 84 per cent in 1920, 81 per cent in 1930, are farms of between 20 and 500 acres. In all five size groups into which farms between these limits are divided by the census, the number of farms decreased in the country as a whole. However, in every size group, numbers of farms increased in some of the States. Farms of 20 to 49 acres, and farms of 50 to 99 acres, increased in number in most States in which the total acreage in farms increased, in some cotton-growing States in which total acreage in farms de-

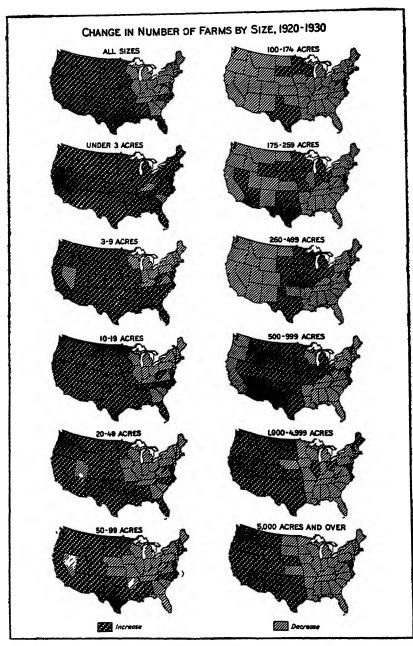


Figure 196—The increased numbers of farms in most of the groups of medium large to large size occurring in the Central and Western States, 1920-1930, may be attributed in part to an expansion in acreage in farms and in part to combinations of farms of smaller size made desirable by increased mechanization. The increase in number of small farms has occurred in connection with increased specialization, an increase in the amount of part-time farming and, in most of the cotton-growing States, to an increase in the cotton acreage

creased, but nowhere else. Farms 100 to 174 acres in size increased in number only in Wisconsin, Minnesota, South Dakota, and Texas.

Numbers of faims in the size groups, 175 to 259 acres, 260 to 499 acres, 500 to 999 acres, 1,000 to 4,999 acres, and 5,000 acres and over increased in at least half of the States, relatively few of which are east of the Mississippi River. In Delaware, Ohio, and Illinois, however, numbers of farms of 260 to 499 acres, 500 to 999 acres, and 1,000 to 4,999 acres, increased. In the Mountain States the expansion in total farm acreage occurring in each State and the acreage released as a result of decreased numbers of farms of 100 to 499 acres, was absorbed by the increased numbers of farms of less than 100 acres and of 500 acres and over. The situation was similar in all three Pacific States except that in them farms of 500 to 999 acres decreased in number also.

Because of the varying importance of farms of different sizes in different parts of the country, and because farms of every size increased in number in some States and decreased in other States, a statement of the degree of change in numbers of farms of any given size can have no great value, taking the country as a whole. With this caution it may be said that numbers of farms under 20 acres in size increased 15 per cent in the United States between 1920 and 1930 while farms of 20 to 49 acres decreased 4 per cent, farms of 50 to 99 acres decreased 7 per cent, farms of 100 to 174 acres decreased 7 per cent, farms of 175 to 259 acres decreased 2 per cent, farms of 260 to 499 acres decreased 5 per cent, farms of 500 to 999 acres increased 7 per cent, farms of 1,000 to 4,999 acres increased 19 per cent, and farms of 5,000 acres and over increased in number 26 per cent.

There is a general interest in large farms because of the increasing extent to which farming is being mechanized. In 1930 there were 9,299 farms of 5,000 acres and over as compared with 7,385 in 1920. These large farms increased in number only in the western half of the country, however, specifically in Nebraska, Oklahoma, Texas, and in the 11 States of the Mountain and Pacific divisions. These States include all but five States in which the total acreage in farms increased between

1920 and 1930.

Most of the largest farms are cattle ranches Texas had 30 per cent of all the farms of 5,000 acres and over in 1930, Montana and New Mexico each had 10 per cent, California and Wyoming each had 8 per cent. Less than 3 per cent of the land area in farms of 5,000 acres and over was in harvested crops in 1929, as compared with 20 per cent in the farms of 1,000 to 4,999 acres, 27 per cent in the farms of 500 to 999 acres, and 48 per cent of the land area in farms of less than 500 acres. These large farms have not greatly affected the profits from crops grown on smaller farms. Of the total crop land harvested in 1929 in the United States less than 1 per cent was on farms of 5,000 acres and more as compared with 81 per cent harvested on farms of less than 500 acres.

Howard A. Turner, Bureau of Agricultural Economics.

## FARM TENANCY INCREASED FROM 38.1 PER CENT OF ALL FARMS IN 1920 TO 42.4 PER CENT IN 1930

During the period 1920 to 1930 an unusual number of farmers in all sections of the United States changed their tenure relationship to the land. In spite of the low prices for farm products, some farmers have paid for farms and others have made substantial progress toward

ownership. Contrasted with these are many who were owners in 1920

but who are tenants now..

The net result of the changes in tenure of the individuals is a continuation of the trend toward more tenancy that has been in evidence since the first report on farm tenure by the census in 1880. The 1930 census shows that the increase in the percentage of tenant-operated farms for the period 1920 to 1930 was the second highest in the 50 years during which decennial statistics have been gathered. In 1930, 42.4 per cent of all farms were tenant operated. This represents an increase of 4.3 per cent in 10 years (from 38.1 in 1920), and of this increase 3.5 per cent was in the period 1925 to 1930. The largest previous increase was from 28.4 per cent in 1890 to 35.3 per cent in 1900.

There has also been an increase in the number and percentage of owner farmers who rent land from others. These are commonly referred to as part owners. The percentage of part owners was 8.7 in 1920 and 10.4 in 1930. If the part owners and tenants are considered as one class, we find that more than half the farmers of the United

States rent all or a part of the land they operate.

The percentage of tenant-operated farms varies greatly in different parts of the country. In Maine 4.5 per cent of all farmers are tenants and in Mississippi 72.2 per cent. The range in the percentage by

counties is even greater than by States. (Fig. 197.)

Although the percentage of tenancy has increased in every decade since statistics were first gathered, this is the first time that the number of tenant-operated farms increased while the number of all farms decreased. There were about 160,000 fewer farms in the United States in 1930 than in 1920 and over 200,000 more tenants. It is of especial significance that this increase is composed mostly of croppers who do not even own work stock.

## Changes in Six Groups of States

A fairly good general picture of regional changes can be obtained

from a consideration of six groups of States.

The Northeastern States, which include New England, New York, Pennsylvania, and New Jersey, show a decrease in the number of tenants and in the percentage of farms operated by tenants. The number of tenants in almost all of the counties in these States showed a decrease of 25 or more. In only two counties did the increase in number of tenants exceed 25. Tenancy is relatively unimportant in these States, varying from 4.5 per cent in Maine to 15.9 per cent in Pennsylvania.

The decrease in tenancy in this section seems to be in part the result of decreased competition for farm land. The older owners find it difficult to rent their farms, hence continue to live on their land and carry on some farming with such help as can be found. Families from towns and cities who want to live on farms, using them for part-time employment, usually want to buy. Many of the owners who sell give good terms, thus enabling purchasers having little capital to buy, especially since the total value of a farm is generally low.

In all of the Southern States, which include Delaware, Maryland, West Virginia, Kentucky, Arkansas, Oklahoma, Texas, and all States south of these, tenancy increased, as measured both by numbers and percentage, except in Maryland and Delaware. The census of 1890 reported that each of the three divisions of the Southern States had approximately 38.6 per cent of its farms operated by tenants, and

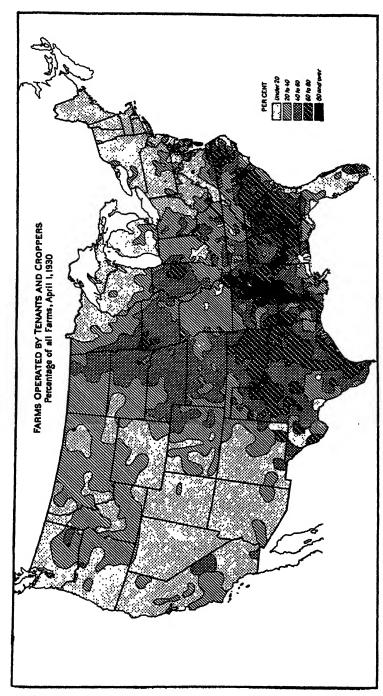


FIGURE 197.—The percentage of tenant-operated farms is highest in regions devoted to the cash crops -cotton, tobacco, corn, and wheat—mostly the Southern and Mildile Western States. The percentage of tenant-operated farms is generally low in regions devoted to general and livestock farming, as in the northeastern portion of the country and in the Western States

each census since has shown an increase. The proportions of all farmers who were tenants in 1930 were as follows: South Atlantic States, 48.1 per cent; East South Central States, 55.9 per cent; and West South Central States, 62.3 per cent. (Fig. 198.) The number of negro tenants in the cotton States decreased about 2,000 between 1920 and 1930, while white tenants increased about 200,000. Both white owners and negro owners decreased in number in these States during this period.

In practically all counties in these States in which tenancy increased there was an increase in cotton or tobacco acreage. Both of these crops require considerable amounts of hand labor, which is generally furnished by the tenants and their families. A part of the increase in tenancy may have resulted from the fact some farmers were forced to give up their farms because of inability to continue payments on the mortgages during the period of low prices. The counties showing

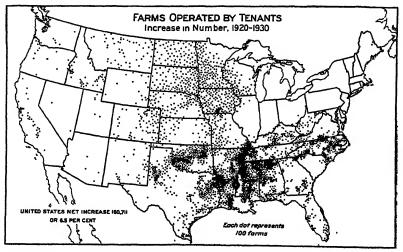


FIGURE 198.—The number of tenant-operated farms increased generally in sections in which the number of all farms increased. An exception is found in the wheat-growing sections, where farms are being consolidated

decreases in tenancy are, as a rule, those in which there has been a decrease in the number of all farms.

The East North Central States, except Wisconsin, have shown marked decreases in tenancy. (Fig. 199.) Only 23 counties in Ohio, Indiana, Illinois, and Michigan had an increase of 25 or more tenants from 1920 to 1930. It is probable that the decrease in tenancy in the East North Central States is associated with the development of a situation similar to that in the Northeastern States—that is, less competition for farm land due in part to the growth of industry.

As a group the West North Central States and Wisconsin have definitely moved toward more tenancy. (Fig. 198.) The increase in tenancy in the West North Central States is without doubt the result of the price situation. Land bought in the period of high prices could not be paid for, with the result that it is now operated by tenants.

The percentage of tenant-operated farms in the Rocky Mountain States increased from 15.4 to 24.4 in the decennial period 1920 to 1930. The number of tenants is not large in many of the counties in this division, but the increase was general. Of the 268 counties in these eight

States, 177 counties showed an increase of 25 or more tenants and only 3 showed a decrease of that number. The increase in tenancy in these States is the result of the low prices of farm products, and is similar to that which has taken place in the West North Central States.

The change in the percentage of tenant-operated farms in the Pacific Coast States has not shown a definite trend during the period for which data are available. The percentage of tenancy decreased in the three States taken as a whole from 20.1 to 17.7 per cent in the decade 1920 to 1930. Approximately one-third of the counties showed increases of 25 or more tenants, another one-third showed decreases of that number, and the remaining one-third of the counties showed very small changes. In all three States many counties have shown an increase in the number of owners of specialized farms devoted to fruit, poultry,

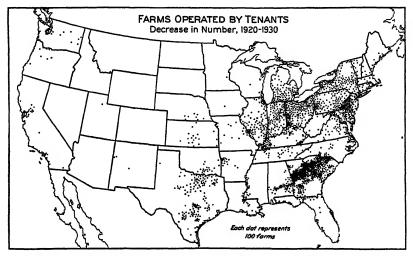


FIGURE 199.—The two areas showing greatest decrease in the number of tenant-operated farms are the northeastern and southeastern portions of the United States. Both also showed large decreases in the number of all farms

and dairy production, which enterprises are not well adapted to tenant operation, but there are counties in which the owners who bought land at high prices have lost their farms, thus increasing tenancy.

O. M. Johnson, Bureau of Agricultural Economics.

### FARM POPULATION IN DECADE 1920-1930 SHOWS A CON-SIDERABLE DECREASE

The outstanding change in the farm population within the decade 1920–1930 is a considerable decrease. In 1920 the farm population of the United States, as enumerated and reported by the Bureau of the Census, amounted to 31,614,269 and formed 29.9 per cent of the total population. In 1930 the Bureau of the Census reports the farm population to be 30,445,350, forming 24.8 per cent of the total population. The crude decrease between the 1920 and the 1930 enumerations is 1,168,919. The Bureau of the Census says:

The farm population as shown for 1930 comprises all persons living on farms, without regard to occupation. The farm-population figures for 1920 include, in

addition, those farm laborers (and their families) who, while not living on farms, nevertheless lived in strictly rural territory outside the limits of any city or other incorporated place. Though the number of additional persons thus included is believed not to have been very great, some allowance should be made for this difference in definition when comparing the figures. Further allowances should be made for the fact that the 1920 census was taken in January, when considerable numbers of farm laborers and others usually living on farms were temporarily absent, while the 1930 census was taken in April, when by reason of the advancing season the number of persons on the farms was appreciably larger.

### Seasonal Variation in Farm Population

The fact stated by the Bureau of the Census, that these two enumerations of the farm population are not wholly comparable, is important in understanding the changes recorded. The number of persons living on farms in the United States is doubtless fluctuating all through the year, from a low point in midwinter to a high point in spring and summer. There are many fluctuations and differences in States, due to the varying make-up of the farm populations, to the prevailing age of the farm operators, to differences in birth rates between sections of the United States and to the nature of the farm enterprises, which may require large temporary forces of laborers in some instances or a

rather constant supply of laborers in others.

To make an enumeration in winter is to get a count of the permanent core of the agricultural people; to make it in the spring is to add to this permanent core a temporary increment from towns and cities of persons who consistently divide their occupational allegiance between town and farm. No one knows at present how large a temporary force the permanent farm population requires to carry on its spring and summer work. Undoubtedly in some of the States showing an increase in farm population in April, 1930, the increase is due almost entirely to this temporary increase of laborers. In late years it has also become a practice in some sections where the nature of the farm enterprise permits, for the farm family to leave the farm and go to town for the education of children or to travel. This temporary force, added to the farm population in the spring and summer, may reach a total for the United States of from 2,000,000 to 3,000,000 persons.

The significant fact of the decrease in farm population between 1920 and 1930, however, must not be overshadowed by the fact that these two enumerations are not entirely comparable. There have been several streams of influence which explain a gradual decrease of farm

population in the United States.

## Mobility of the American People

The great mobility of the American people is striking. Since 1870 the census has recorded the State in which each person was born; and the number of persons registered as living, decade to decade, in California, Iowa, Illinois, Missouri, New York, and other States, but born in Vermont, Virginia, Texas, Louisiana, and other States, is interesting and enlightening. This mobility has been an economic safety valve. Farming has not become an occupation so socially rigid that the farmer has been shut off from other economic opportunity. Undoubtedly this democracy of occupation and economic opportunity is an advantage to agriculture as well as to the Nation at large.

In 1790, 96.7 per cent of our population was "rural"—composed virtually of farm and village population. In the next 50 years, up to

1840, the rural population declined to 91.5 per cent of the total population; in the next 30 years (to 1870) it declined to 79.1 per cent. By 1880 it had declined to 71.4 per cent; by 1890, to 64.6 per cent; by 1910, to 54.2 per cent; and by 1920, to 48.6 per cent.

## Absolute Decreases by States

Inspection of the rural population by States shows that absolute decreases in numbers took place in Vermont and New York in each of the following decades: 1880 to 1890; 1890 to 1900; 1900 to 1910; 1910 to 1920. In Maine, New Hampshire, Ohio, and Illinois, absolute declines in numbers took place in three of the four decades noted above. Furthermore, in 18 States there was an absolute decline in numbers during the decade 1910 to 1920. The presumptive evidence is strong that if the farm population had been tabulated separately in the census during the decades before 1920, it would show not only a relative decline in percentage, but an absolute decline in numbers in the farm population in certain States from 1880 to 1920. Indeed, it is almost certain that the total farm population of the United States in absolute numbers declined from 1910 to 1920.

It must be evident that there is a reason for the main decline in numbers of farm people which has no explanation in the facts of war or

postwar influences.

Three factors can not escape notice—factors which though related have not become simultaneously and equally effective in all States. These factors, moreover, while accounting for a decrease in farm population, make for agricultural prosperity. There is a conflict of forces at work, all tending to build up agriculture, but also tending to decrease the number of farm people to a point where the number is

adjusted more perfectly to the agricultural task:

(1) There is the bodily transfer of several important agricultural processes from the farm to the town and city, in connection especially with grain, livestock, and milk; (2) the mechanization of many agricultural processes remaining on farms, especially in plowing, planting, harvesting crops, in feeding and care of animals, in dairy operations, and in automobile transportation; (3) and perhaps most important, the improvement through scientific methods of agricultural production, such as improved breeds of grains, vegetables, fruits, and animals, improved conditioning of soils, improved protection against plant and animal diseases.

It is difficult to imagine any other result of these three important forces operating upon American farming than the normal reduction of the necessary number of persons and families to produce the food and

fiber for the Nation.

The agricultural depression of 1921 undoubtedly accentuated the long-time downward trend of farm population, but this fact should not blind us to the operation of the normal forces of adjustment which have long been operating in the interest of agriculture. We are not to expect a decline in farm population below the point of a number of persons adequate to carry on farm production for the needs of the Nation. Indeed, as population in the United States increases, we may see an upward adjustment to give adequate production.

C. J. Galpin, Bureau of Agricultural Economics.

#### EMPLOYED IN FARMING DE-GAINFULLY WORKERS CREASE IN RECENT YEARS

In the last 20 years there have been marked declines in the numbers of certain classes of agricultural workers, and in the proportion of the gainfully occupied population engaged in agriculture. According to the census the proportion of the gainfully employed persons engaged in agriculture was 32.9 per cent in 1910; 26.3 per cent in 1920; and 21.5 per cent in 1930. One hundred years ago over two-thirds of the

persons gainfully employed were engaged in agriculture.

The census of 1910 was taken as of April 15, and that of 1930 as of April 1. Because the census of 1920 was taken as of January 1, its occupational statistics, especially as to agriculture, are not fully comparable to those of the other two censuses; consequently the 1920 statistics are not further considered here. Female workers also are not considered in the comparisons made, because statistics relating to them in the 1910 census are not fully comparable to those of 1930. The changes in total numbers of males engaged in agriculture, of wage-earning farm laborers, and of unpaid family laborers are to be considered principally.

The census of 1910 reported 10,583,212 males engaged in agriculture; that of 1930 enumerated 9,568,347. This indicated a decline of 1,014,865 persons, or 9.6 per cent. There were 2,642,070 male farm laborers "working out," and other wage workers in agriculture in 1910. They may be compared, roughly, with 2,555,935 farm laborers working for wages in 1930; and 2,133,949 farm laborers "working on home farm" in 1910 as compared, roughly, with 1,171,687 unpaid.

family workers in 1930. (See footnotes to Table 7.)

Table 7.—Changes in number of males 10 years of age and over engaged in agriculture, between April 15, 1910, and April 1, 1930, by geographic divisions [Decrease indicated by minus sign (-): increase, by plus sign (+)]

	Numerical change			Percentage change		
Geographic division	Total	Paid 1 workers 3	Unpaid family a workers a	Total	Pald 1 workers 1	Unpaid family; workers;
				-		
New England Middle Atlantic East North Central West North Central South Atlantic East South Central West South Central	Number -64,096 -204,215 -351,892 -103,916 -272,678 -200,006 -27,632	Number -12,648 -71,045 -60,734 +40,244 -27,754 -18,833 +4,421 +19,570	Number -14, 170 -56, 479 -100, 600 -154, 639 -203, 814 -177, 257 -182, 315	Per cent -23.7 -26.5 -19.9 -5.9 -11.0 -11.8 -1.2 +22.9	Per cent -11.8 -25.2 -13.0 +10.9 -6.0 -17.0 +1.2 +14.7	Per cent -60 5 -64.9 -58.9 -48.1 -40.7 -38.5 -44.2 -2.9

+73, 644

-86, 135 | -962, 262

-12,066

+33 2

+43. 1

-45. 9

-45.1

+124,723

workers.

<sup>&</sup>lt;sup>1</sup> The classes included are: In 1910—dairy-farm laborers; farm laborers (working out); gardeners; florists; garden, cranberry-bog, greenhouse, orchard, and nursery laborers; corn shellers, hay balers, and grain threshers; ditchers; poultry raisers and poultry-yard laborers; stock horders, drovers, and feeders; and other and not specified pursuits; in 1930—farm laborers, wage workers.

<sup>2</sup> The classes included are: In 1910—farm laborers, home farm; in 1930—farm laborers, unpaid family workers.

workers.

I There is some overlapping of classes, but the comparability of the data chosen seems not much affected. While some entrepreneurs and unpaid workers were enumerated by the census among the classes here included as paid workers, most of the people included in these classes appear to have been wage workers. It is known that some home-farm laborers receive wages. Unpublished data of this department indicate that of total time spent on farm work in a year shout 4½ per cent is put in by paid members, and 23½ per cent by unpaid members of the farm operators' families. These figures apply to the United States as a whole. There are wide differences in the various States.

Between 1910 and 1930, all of the geographic divisions except the Rocky Mountain and Pacific lost in number of males engaged in their agriculture. The heaviest losses were in the Northeast. In these Northeastern States there occurred also the greatest decline in numbers of The lowest losses were in the West Central States, where there were gains in numbers of farms. In all except two States east of the Mississippi, numbers of persons in agriculture decreased, the losses ranging from 2.3 to 35.1 per cent. In Wisconsin the number was practically stationary (0.1 per cent gain), while in Florida the gain was 25.8 per cent. In the 11 far Western States the 9.5 per cent loss in New Mexico was more than offset by gains elsewhere, running to 75.7 per cent in Arizona. California's gain of 57.5 per cent was numerically over half the net gain of the far Western States. The notable spread of intensive agriculture doubtless explains much of the gain in Florida, Arizona, and California. Changes in number of males engaged in agriculture are closely related to changes in numbers of farms and in type of farming, and to extension of use of labor-saving equipment.

### Loss in Unpaid Family Workers

Most of the Nation's loss in male agricultural workers has been of unpaid family workers. This loss was about 962,000 persons, or 45 per cent. Each geographic division, and all except four of the Rocky Mountain States, reported such losses. As in the case of total males, the heaviest losses were in the Northeast, running to 74.1 per cent in New Hampshire. The loss was 68.6 per cent in Indiana and in Illinois. The lowest regional loss was 2.9 per cent in the Rocky Mountain States. This decline was numerically unimportant for the division, but there were sharp declines in some States nearly balancing sharp gains in others. Utah and New Mexico had the greatest losses, and Montana and Arizona the greatest gains in the division. The loss of unpaid family workers in California was large in percentage, but small in numbers, comparatively, because of the unusually high proportion of hired workers among the males in the State engaged in agriculture.

From 1910 to 1930 the United States lost 86,135, or 3.3 per cent, of its paid male agricultural laborers. Each geographic division east of the Mississippi River reported loss, while those to the west gained. In the East, the Middle Atlantic division had decidedly the highest loss, 25.2 per cent. Only two eastern States, Florida and Wisconsin, made large gains, 67.4 and 24.6 per cent, respectively. West of the Mississippi, Louisiana sustained a 33.1 per cent loss. California's gain of 66 per cent, or 73,506 such workers, was greater than that of any other

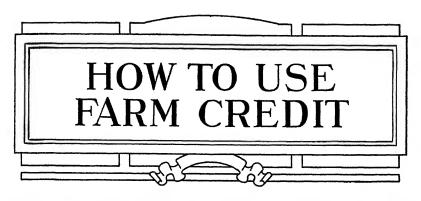
three States, and practically all of that on the Pacific coast.

Male paid workers and male unpaid family workers on farms were not the only occupational classes to gain or lose. In addition, farm operators declined sharply in numbers east of the Mississippi River, and slightly in the West North Central States. In the South Central and far Western States the number of farm operators increased, especially in the West South Central and the Pacific States.

Because agriculture is fundamental to the production of the food supply of the Nation, the decline in numbers of farm workers may at first seem startling. But this result has been brought about by a steady increase in production per worker fully sufficient to meet the agricultural

needs of the Nation.

Josiah C. Folsom, Bureau of Agricultural Economics.



## TOTAL INDEBTEDNESS OF UNITED STATES FARMERS ESTIMATED AT 13 TO 14 BILLIONS

Economic developments since 1920 emphasize clearly the importance of a conservative use of credit in the production program of the farmer. Although it is impossible to avoid a large part of the distress and financial embarrassment resulting from such a drastic price decline as has occurred in recent years, many present difficulties are due directly to the careless use of credit. Others are due to the lack of credit in the proper amount and at the proper time.

The types of credit employed in agriculture fall mainly into four classifications: Real estate mortgage credit, short-term loans, intermediate-term loans, and merchant credit. A fifth group, marketing credit, might be included; but inasmuch as it is more frequently negotiated by others than farmers and is obtained largely from financial institutions in the larger centers, it may be logically included in short-term commercial

bank credit.

Of the various types of agricultural credit, farm real estate loans are the most important from the standpoint of volume. The total farm-mortgage indebtedness materially exceeds \$9,000,000,000, notwith-standing a slight reduction in the last two or three years, partly as the result of amortization of principal, but primarily through an increased volume of foreclosures.

The short-term indebtedness of farmers is represented chiefly by loans from local banks in agricultural areas. In 1923, loans of this character were estimated at slightly less than \$3,000,000,000. This amount has since been somewhat reduced by the large number of bank suspensions and through the policy of country banks in making investments outside their communities an increasing proportion of their total assets.

Satisfactory estimates of the amount of intermediate-term loans owed by farmers are not available. A large proportion of the loans of this type is included in the total credit advanced to agriculture by country banks. Additional amounts have been advanced by livestock-loan companies and by farm-implement companies. On September 30, 1931, rediscounts of the Federal intermediate-credit banks totaled \$81,000,000. This amount, however, also includes short-term loans for crop production.

Data on the amount of outstanding merchant credit are likewise meager and unsatisfactory. The annual volume of such credit has been estimated to exceed \$1,000,000,000. Other short-term obligations of farmers, owed largely to individuals, and for which no estimate is available, doubtless also amount to a substantial sum.

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### Shift in Credit Sources Since 1920

Since 1920, there has been a marked shift in the sources supplying credit to farmers. The collapse of the war-time inflation boom occurred at a time when farmers generally were heavily indebted to local banks and to local dealers for supplies and equipment. In the period immediately following, a large part of this short-term indebtedness was funded into long-term real estate loans. The volume of farm-mortgage indebtedness which was estimated at \$7,857,700,000 in 1920 increased to a total of \$9,360,620,000 in 1925, and in 1928 it was placed at \$9,468,526,000. In 1930, the total indebtedness showed a slight decline to \$9,241,390,000. The sources of these loans in 1928, classified according to the principal groups of lenders, were as shown in Table 8.

Lending agency	Amount		Lending agency	Amount	
Federal land banks	Million dollars 1, 146 667 1, 020 988 2, 164 1, 006	Per cent 12.1 7.0 10 8 10.4 22 9 10.6	Active farmers	Million dollars 339 1, 453 685	Per cent 3. 6 15. 4 7. 2

Table 8.—Sources of loans to farmers in 1928

Since 1920, the Federal and joint-stock land banks have assumed an increasing importance as a source of farm mortgage credit. Loans from individuals and banks, however, have decreased in both relative and absolute importance. Life-insurance companies have risen to the leading place in financing farm-mortgage credit requirements.

The present lack of local credit facilities in many localities, occasioned by numerous failures of country banks, has led to an increased interest in the organization of agricultural-credit corporations and similar institutions utilizing the rediscount facilities of the Federal intermediate-credit banks. The expansion of this type of credit, however, has been relatively slow. In April, 1931, there were 330 credit corporations and livestock-loan companies using Federal intermediate-credit bank facilities. These corporations had a total unimpaired capital, surplus, and undivided profits, of \$21,825,000.

Considerable assistance has been supplied by the Federal Government in meeting the most pressing credit requirements of farmers in areas seriously affected by the drought or other climatic adversities. Since 1921, seven annual appropriations, totaling \$83,750,000, have been made by Congress for loans directly to farmers, chiefly for the purpose of purchasing seed, feed, and fertilizer. In 1931, total appropriations for these emergency purposes totaled \$67,000,000 and loans

were made in 32 States.

In all, the total indebtedness of farmers for all purposes may be roughly estimated at \$13,000,000,000 to \$14,000,000,000. The annual interest charge on this indebtedness may be assumed to average about 6 per cent on the real estate indebtedness, 8 per cent on the short-term indebtedness, and between 15 and 20 per cent on merchant credit, making an annual carrying charge approximating \$900,000,000. Much of this interest burden might well have been avoided by a more conservative use of credit. Excessive reliance on credit, however, is

by no means a universal trait of farmers. As a class they have smaller credit obligations in proportion to their assets than have most other economic groups. Many farmers avoid resorting to credit even when it could be used to decided advantage.

NORMAN J. WALL, Bureau of Agricultural Economics.

## MERCHANT CREDIT IMPORTANT IN FARM FINANCE, BUT MAY HELP OR HARM THE FARMER

Older than any of the forms of cash borrowing is the use of credit in purchasing goods. The seller, usually a merchant or dealer, becomes a source of credit by permitting payment at a later date. No conclusive figures are available for the annual amount of farm credit extended by merchants and dealers in the United States but it probably exceeds \$1,000,000,000.

Such credit used by farmers varies materially among the different sections of the country. It is relatively more important in the South than in the North and West, and its use varies with the amount of purchased materials or equipment necessary to produce the year's

crop or other farm products.

The purposes of merchant credit naturally conform to the demands of the type of farming served. Dairy feeds in the North Atlantic States, fertilizer in the South, and machinery and equipment in the West are particularly important items frequently purchased on time. Although the most widespread use of merchant credit is probably for the purchase of household supplies and hardware, there is a tendency for this type of credit to be concentrated on the items requiring large expenditure. In 1931 manufacturers estimated that one-third of all fertilizer used in the South was purchased on credit. On the Eastern Shore of Virginia where early potatoes are the main cash crop and fertilizer the largest single item of supply expense, approximately 85 per cent of the fertilizer used for this crop in 1928, 1929, and 1930 was sold to farmers on time.

The agencies which extend merchant credit to the farmer include the local storekeeper; the local dealer in machinery, feed, or other supplies; seed and fertilizer companies; and local and central marketing agencies. Oftentimes the local agencies in turn receive a large share of their financing in the form of merchant credit extended by wholesale houses and other central agencies. In the case of the Virginia potato area, about 50 per cent of the fertilizer was sold on time

to the supply dealers by fertilizer companies.

## Sometimes a Major Form of Credit

At times in certain localities merchant credit has become a major form of credit, because of emergencies arising out of bank failures, crop failures, or poor prices. In such cases merchant credit has been of great service to the farmer notwithstanding its relatively high cost. Because it is the most direct, it is often the most convenient means of borrowing. Even for those to whom bank credit is available it cares for many small items for which payment in cash can not be made readily because borrowing at the bank is done in larger sums.

Arrayed against these advantages, however, are other considerations which tend to make merchant credit a wasteful and dangerous form of financing. The cost generally is higher than for other credit, the cost burden is inequitably distributed, and the ease of credit ac-

commodation favors overspending.

The cost is greater because of greater risk and a more lax security policy. Frequently the actual cost is concealed. Very generally, goods sold to farmers on time bear a higher price than when sold for cash. This difference in time prices and cash prices often is so large as to constitute a rather startling interest cost when expressed as a per annum rate. The facts that a part or all of the credit cost is so generally in the form of an increase in price, and that such credit usually runs for varying periods, make difficult the computation of the actual rate of cost. The pronounced differences in the cost of merchant credit and credit from cash-lending institutions as found in studies made in Southern States, are indicated in the following Table 9.

Table 9.—Costs of mcrchant credit and cash credit in five Southern States expressed as rates per annum

State	Year	Merchant credit	Cash credit
North Carolina	1926 1926 1926 1926 1925–26	Per cent 25 0 26.3 31 6 17 7 34.8	Per cent 7 7 11.5 9.6 8.7 11.4

### The Factor of Risk

In much of the merchant credit, added risk arises from the financing of a more hazardous type of enterprise as well as from lower financial responsibility of many of its users. The preferred part of the community's credit demand will ordinarily be met by cash-lending institutions operating under interest-rate restrictions. The less substantial borrowers that tend to rely upon dealers for credit find accommodation only upon such terms as will permit the absorption of losses from unpaid accounts. Those who pay their bills also pay heavy losses chargeable to those who do not. These losses often offset the greater part of the credit charge as shown by a tabulation (Table 10) of merchants' reports obtained in credit surveys in North Carolina and South Carolina.

Table 10.—Charges and losses on merchant credit in North Carolina and South Carolina, expressed as rates per annum.

Stato	('harges	Losses	Gain
North Carolina	Per cent	Per cent	Per cent
	2; 3	13 9	9.4
	35, 0	14 6	20.4

The allowance for loss which the time merchant finds necessary in view of the character of his trade as a whole, represents a serious waste for the community and imposes a severe penalty on the debt-paying farmer. In some localities prices of goods sold on credit may not be higher than the prices for cash purchases at the same store. Prices in

such stores, however, commonly are somewhat higher than those in stores selling on a strictly cash basis. The loss from unpaid accounts in this case is distributed among all the customers rather than among only those who use credit. The convenience which store credit offers may easily result in a habit of overspending. This is doubly disadvantageous because of the additional cost involved in the higher credit price on the goods.

## Change Would Have Broad Advantages

The farmer who uses merchant credit from habit rather than from necessity can improve his position by getting out of that class of borrowers. Graduation into the class that uses bank credit instead of merchant credit often requires changes in the type and methods of farming as well as in the financial practices. Less reliance on a single crop, a production plan requiring fewer purchases, or a larger farm unit may be necessary. A record for reasonable efficiency in production and some unencumbered assets saved and accumulated from earlier years, are usually required from applicants for bank credit. Only by energetic striving for these qualifications, if they are not already possessed, can the present users of merchant credit hope to escape from the waste and expense generally associated with it. The more general substitution of cash credit from conservative and specialized credit agencies for the present more haphazard merchant credit, will in the long run benefit not only the farmers and the bankers but the merchants as well.

> DAVID L. WICKENS and BURTON D. SEELEY, Bureau of Agricultural Economics.

## INTERMEDIATE CREDIT FACILITIES CAPABLE OF SUB-STANTIAL EXPANSION

Loans for the purposes of improving, stocking, or equipping the farm can not, as a rule, be repaid within the period usually allowed on short-term production credit. They may require a term of two or three years, but do not call for the very long term usually needed in the case of farm mortgages. Such loans have come to be known as intermediate credit. Loans to provide farm buildings and machinery, tiling or fencing, work stock, dairy or beef cattle to diversify

production, are quite likely to require an intermediate term.

On many farms the reorganization of the production program to obtain a better and fuller use of the land and of the labor time of the farm operator and his helpers, may bring an appreciable increase in the annual net returns. With better equipment it may be possible to care for the field work of certain additional crops without any increase in labor. On many farms, additional livestock can be profitably used as a means of marketing surplus feed supplies. In the so-called 1-crop regions, a considerable reduction in the "out-of-pocket" expenses can be obtained by producing a larger proportion of the food and feed supplies needed on the farm. In order to accomplish this, it is frequently necessary, however, to increase the investment in livestock, in housing, in fencing, and in other farm and soil improvements.

The farmer should first appraise carefully the increase in his net annual returns that may be expected from his proposed investments. Farmers occasionally buy expensive equipment which accomplishes a material saving in labor time, but at a season when the released labor can not be profitably employed in other productive enterprises. In such instances, the investment in the machine merely results in increasing overhead costs without increasing farm returns. Unless the individual farmer already has a current income well above his current obligations, expenditures of the type which facilitate farm operations but do not increase the net income should be entered into with extreme care. The thoughtless borrower otherwise may be forced to sacrifice some of his personal property in order to meet payments on intermediate obligations.

### Partial-Payment Plan

It is highly desirable that repayment of loans for these purposes be made on the partial-payment plan. In such case, the principal should be reduced as rapidly as possible in order to lessen the risk of price fluctuations. This risk increases, of course, with the length of the loan period. The crop yield on a given farm may at times vary even more than the price of farm products. With uncertainties in both price and yield, all years of favorable income should be taken advantage of to retire as much of the obligation as is consistently possible.

For the different classes of livestock more or less definite price cycles have hitherto occurred, making them sometimes high and at other times low in relation to the general price level. Borrowing to expand operations in a given class of livestock when prices are relatively high involves not only the risk of a disappointing income from the livestock as prices decline, but also involves a reduction in the value of the underlying security. This decline in inventory value may cause the forced liquidation of the loan by sale of the security. Years of favorable prices give opportunity for producers to reduce their credit obligations to a minimum, thus accumulating a reserve borrowing power which can be used in expanding operations when prices have reached a lower level.

The country bank has been the chief source of intermediate credit, loans being obtained for short periods and frequently renewed. This short-term renewal plan has the disadvantage that the bank may find it necessary to require prompt payment if credit conditions become unfavorable. Often renewals of this type of loan are willingly granted when farm returns are favorable, and under such conditions the borrower frequently accepts the renewal and expands his operations on the basis of his increased income. In years of unfavorable farm income, on the other hand, the bank may require the maximum liquidation. The result is too often a pyramiding of credit in good years and a severe contraction in years of reduced income and prices.

## Loans by Implement and Livestock Companies

A considerable volume of intermediate credit has been extended by farm-implement companies and livestock-loan companies. Such credit from the former is often costly and is usually extended to facilitate sales with little regard to its advantage to the farmer. Livestock-loan companies of the older type performed a valuable

service, but loans from these agencies were confined chiefly to larger

growers and feeders.

In 1923 the Federal Government established 12 Federal intermediate-credit banks to provide farmers with credit of an intermediate term. These banks do not make direct loans to individual farmers. They discount furmers' notes for banks and other credit agencies, and are authorized to make direct loans to farmers' cooperative associations.

Several hundred agricultural-credit corporations have been organized to obtain credit for farmers by using the discount facilities of the Federal intermediate-credit banks. The term of loans and discounts by these banks is limited to a maximum period of three years, and in practice has rarely exceeded one year. Renewals, however, are granted when circumstances justify, and these banks, which draw their loanable funds from the central money markets through the sale of debentures, are more likely to be in position to grant renewals than are many commercial banks that rely upon deposits.

### Management by the Banks

The 12 Federal intermediate-credit banks are managed by the same directors and officers that manage the Federal land banks, each Federal land-bank board having charge also of one intermediate-credit bank. All these banks, as well as the joint-stock land banks, operate under the supervision of the Federal Farm Loan Board in Washington, D. C.

The Federal intermediate-credit banks have as yet supplied only a small part of the intermediate credit needed by farmers. They have, nevertheless, been of real assistance to farmers' cooperative marketing associations and to many local credit institutions and their farmer clients, in areas where this new source of credit has been used. Their loan and discount operations are capable of a very substantial ex-

pansion.

In most communities there has been a lack of local credit agencies that were willing and able to use the discount facilities of these banks. The recent action of the Federal Farm Loan Board in allowing the local bank or credit corporation a somewhat wider spread between the discount rate and the rate charged the borrower may be expected to increase the use of these discount facilities to the benefit of the farmer in need of credit. This should be particularly true of farmers who have in mind well-considered farm improvements and programs that require credit for an intermediate term.

NORMAN J. WALL and FRED L. GARLOCK, Bureau of Agricultural Economics.

## SHORT-TERM CREDIT IS BEST RESTRICTED TO PRODUC-TIVE USES

It often is said that farmers should use short-term bank credit only for productive purposes. Taken literally, this means that farmers should not borrow unless by so doing they can increase their profits or avoid losses. The rule is intended to discourage unnecessary or wasteful expenditures by the use of credit. Although opinion may be divided as to the rigidity with which this rule should be applied, few persons will deny the wisdom of its warning. It is a common weakness to desire comforts and luxuries that are beyond one's means. For this reason it is hard to deny oneself when credit is easily obtained. If comforts or luxuries are limited to those which can be purchased with funds actually possessed, the worst that can happen is failure to accumulate savings. When they are purchased with credit, however, the result is likely to be a burden of indebtedness which will become progressively more difficult to carry. Limiting borrowing to the necessaries of production is one of the surest methods of avoiding extravagant expenditure and of accumulating a reserve for future needs.

If the spirit of the rule is borne in mind, the term "productive purposes" may be liberally interpreted. Borrowing to pay taxes, necessary living expenses, and interest on mortgage indebtedness may be sound uses of bank credit, if the amount of such borrowing is kept well within the farmer's current income-producing power. Frequently, expenses of this character have to be met at a time when it is disadvantageous to dispose of crops or livestock. In such cases, it is most profitable to meet those needs by borrowing, and to mature or hold products until they may be sold to better advantage. Unforeseen emergencies may necessitate borrowing for purposes that would not

ordinarily be classed as productive.

Under some circumstances, it may even be desirable to borrow for vacations, automobiles, or radios. But these are border-line cases and may easily be carried to excess. The spirit of the rule is to keep expenditures well below income so that each year one's accumulation of savings will be increased.

### The Bankers' Problem

Unwise loans not only are a detriment to the borrower but they also are likely to impair the services of banks. Each year many farmers of a community need financial assistance in growing and marketing their products. Banks have a fund of deposits from which they make advances for these purposes. Once the funds are loaned, however, future advances depend upon the repayment of advances made in the past. Loans made to finance the operations of one season must be paid if the banks are to have funds for financing the next season's operations. When borrowers fail to pay their notes, they impair their own borrowing positions and reduce the ability of banks to finance local productive operations. Furthermore, excessive loans frequently cause banks as

well as farmers to become hopelessly insolvent.

When borrowing seems advisable, or becomes necessary, farmers should attempt to obtain loans that will not mature before there is a reasonable chance of paying them. It is a widely prevailing practice among bankers to date notes at 60, 90, or 180 days with the tacit understanding that they will be renewed at maturity if the funds are needed for a longer period and if conditions of the loan remain sound. When all is going well, this practice works little, if any, hardship to farmers. But it is likely to produce a false appearance of liquidity in banks, and in a time of stress farmers may be asked to pay before they are in position to do so without disrupting their farming operations. Both bankers and farmers should be benefited by a careful consideration of the time within which payment is likely to be possible and a

frank recognition of the necessary duration of the loan in the conditions of the note.

Most country banks have a customary rate of interest which is charged to the rank and file of borrowers. Nearly always, however, some farmers obtain preferential rates by reason of borrowing large amounts, offering excellent security, and carrying large deposit balances. While banks need some average rate on their loans in order to maintain themselves, it is not necessary that this rate be charged to all borrowers. Farmers who are more than ordinarily valuable to their banks may reasonably expect to receive advantages in the form of preferential borrowing rates. On the other hand, farmers who are poor credit risks and whose deposit accounts are a source of more expense than income to the banks find it difficult to secure loans even at the customary rate.

### Interdependence of Banker and Farmer

What has been said here emphasizes the interdependence of banker and farmer. For the financing of current operations, most farmers have few, if any, sources of credit other than their local banks. Local banks, in turn, depend mainly on local deposits for their loan funds. The high charges for loans which are paid by farmers in many areas may be traced directly to the personal and agricultural risks involved in such loans and to the inadequacy of local supplies of deposit funds.

Because of this interdependence, farmers and bankers will profit most from an attitude of utmost frankness, sympathy, and fairness in their relations with each other. By making a complete and accurate statement of his financial position the farmer gains the benefit of the banker's opinion on the soundness of his proposed venture. The banker in turn is assisted in maintaining a condition that will enable him to finance the requirements of his farmer customers. By explaining frankly the reasons for refusing a given loan, the banker may save his farmer customer from an unwise venture and save his bank from the resentment of an offended customer. Frankness and fair dealing promote the most friendly relations between banker and farmer, with profit to both.

FRED L. GARLOCK, Bureau of Agricultural Economics.

# MORTGAGE CREDIT USE REQUIRES CLOSE STUDY OF LONG-TERM FACTORS

At least once in the life of nearly every farmer there arises the question whether he will use farm-mortgage credit. Such credit usually represents a major credit transaction in which the farmer employs the greater part of his property to secure the loan, and assumes a debt which, on the average, continues in whole or in part for an active lifetime. Whether the mortgage results in improving the farmer's financial condition depends largely upon how he deals with several special problems connected with the proposed loan. The more important of these are the problems presented by the trend of prices during the term of the mortgage, the amount of the mortgage with relation to the productive capacity of the farm involved, the use that is made of the borrowed money, the cost in the form of interest and commission charges, and the conditions of repayment.

The more common occasions for a farm mortgage are the purchase of a farm, the improving or equipping of a farm already owned, or the funding or refunding of existing credit obligations. Land acquired by this means should give reasonable assurance of yielding an income covering interest and other fixed costs, in addition to operating costs. Improvements made by means of credit should increase farm production or decrease costs. Funding or refunding of outstanding debt should result in reduced cost of credit and in added assurance that payments will not fall due until funds for such payments are available or renewals can be arranged. Since the amount of the farm mortgage usually is several thousand dollars, and is materially larger than other farm credit transactions, the ultimate effects of accumulating interest are more serious than on other farm credits. Therefore it is important to have clearly in mind the means by which interest charges at least are to be earned, when deciding what purposes warrant the use of the farm mortgage.

Occasionally the farm mortgage serves a useful purpose in replacing or consolidating other forms of credit, as for example when local capital is depleted by crop failures or low prices or when for these or other causes local banks fail or bank credit becomes restricted. When capital funds are thus used for current operating purposes it is particularly important that the activities linanced should earn the means of repayment and that returns should be set aside for that purpose.

## Repaying Power Rather Than Borrowing Power Should Govern

Too often farm-mortgage loans have been limited only by what could be borrowed rather than by what could be repaid. If a mortgage loan

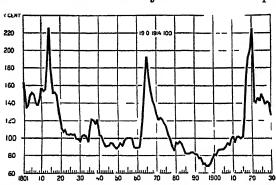


FIGURE 200—Three times since 1500 prices have risen to very high levels—in 1814, 1805, and 1920. After each of these peaks prices have fallen sharply and then more gradually for a period of years. Debt incurned during these periods of high prices has been repuable under the difficulty of using dollars of greater purchasing power and product returns of smaller debt-paying capacity.

is obtained from an established loan agency, this agency may limit the amount to a reasonable part of the value of the farm. But if a mortgage is given to the former owner in payment for land purchased it may represent practically the full selling price of the turm. As long as the land will sell for as much as the mortgage, the debt can be repaid by sale of the

property. Usually, however, farmers do not sell their farms, but keep them as homes. If land prices should decline, the mortgage should normally be of such size as to permit of renewal. Particular caution in assuming mortgage debt is necessary when prices are high. If a first mortgage represents half the land value when prices are high, renewal may be difficult when prices are low, and for loans with higher ratios renewal may be impossible. When land values are low, loans more closely approaching sale values may be justified.

Assurance that the farm, under proper operation, will carry the debt requires careful attention to the position and trend of the price level when the loan is made and to the term of years during which the loan is to run. If prices are high the farmer should, as far as possible, provide for such payment or reduction during the period of high prices as will make the debt of manageable proportions afterward. Since 1800, periods of decidedly high prices have been short, each period extending over a few years at most. (Fig. 200.) The abrupt rise of price peaks has been similar in each case and the subsequent drop has resulted in severe difficulty for heavily burdened borrowers.

## Customary Periods of Indebtness

Except for amortized loans, the term of most mortgages is five years, but the average period of indebtedness for the encumbered farm is about 30 years. The debt-paying capacity of crops for each

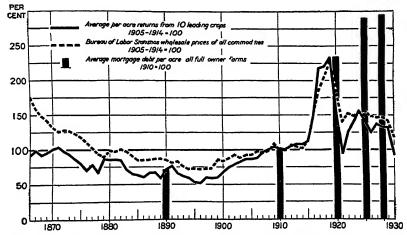


Figure 201—Returns per acre of 10 keding crops, price level and average debt per acre. The value of returns from the 10 leading crops has shown a fairly close relation to the general price level from 1866 to 1929. The amount of indebtedness per acre of owner-operated farms also showed a close relation to the general price level from 1890 to 1920. Thereafter, however, the debt increased while prices fell. The result was an increased builden with the mains of carrying it reduced meanly one-hill. During shup price rises heavy indebtedness can be incurred only with dauger of later difficulty.

year since 1866, as shown in Figure 201, suggests the danger of contracting obligations during a period of high prices to be paid during years of low or average prices. Insufficient allowance for these factors during the war years and immediate postwar years has resulted in numerous farm bankruptcies and foreclosures.

Closely related to the amount to be borrowed is the method by which the debt is to be paid. Periodic reductions in the principal of the loan may be by an amortization plan whereby the debt is entirely paid through a long period of years, or by annual payments on loans running for a shorter term of years. When there are no provisions for such payments in the contract the farmer may attain the same end by setting aside from current farm returns amounts to be applied on the principal of the debt. In addition to having the merits of systematized saving, periodic payments lessen the danger from price

declines by retiring part of the principal with farm returns reflecting prices of products more nearly approximating the price level at which the debt was incurred.

## Cost of Mortgage Credit

The cost of mortgage credit warrants close attention because of the usually large sums involved and the substantial part that interest commonly takes from farm earnings. In most of the farming areas higher rates will occur on loans from local sources, and on loans representing large proportions of the value of the property. Additional cost may appear in the form of commissions and fees, and in a higher sale price for land purchased when a large part of the consideration takes the form of a promise to pay.

The wise use of farm-mortgage credit requires that the farmer consider many long-term economic factors and many questions about the source of the loan as well as the terms and conditions involved. There is no other way, however, of borrowing with safety sums large in relation to the value of the security, unless the borrower has other unencumbered resources upon which he can rely. A large proportion of the cases of financial disaster that have overtaken farmers during the last decade have been caused by failure to weigh correctly the

dangers as well as the benefits involved in the use of farm-mortgage credit.

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## CHEMICAL UTILIZATION OF FARM BY-PRODUCTS HAS LARGE PROSPECTS

The products and by-products of agriculture have been used in the preparation of chemical substances since prehistoric times. Starch, separated from roots and cereal grains by crude processes of milling, was one of the earliest organic chemicals prepared by man. Alcohol, as a constituent of wine and other fermented beverages, is another example of a very early chemical product, although its separation from its dilute solutions into pure concentrated form for industrial uses

came about only after the discovery of the art of distillation.

A careful distinction must be drawn between agricultural-chemical products which are of primary origin and those of secondary origin. The products in the first group are produced directly by the plant or animal; cellulose, starch, sucrose, lactose, dextrose, citric acid, tartaric acid, fat, and protein are examples of this very large primary group. The products of secondary origin are obtained from the primary group by some process of chemical modification such as fermentation, dehydration, hydrolysis, oxidation, reduction, or destructive distillation. Alcohol, acetic acid, lactic acid, furfural, glycerol, dextrine, and methanol are examples of familiar chemicals belonging to

this secondary group.

With the great advancement in synthetic organic chemistry during the past half century, it is possible to manufacture from inorganic materials many chemicals, originally derived from plants or animal substances. Several once-important agricultural industries, with longestablished histories, have been forced out of existence by their inability to compete with synthetic chemical products. The cultivation of indigo, for centuries a leading agricultural industry of India and other tropical countries, has been almost completely eliminated by the introduction of synthetic indigo. In a similar way the cultivation of madder, at one time an important crop in various European countries, was obliged to retire upon the advent of the synthetic dyestuff alizarin the tinctorial principle of the madder plant. Great privations among certain agricultural populations were caused by the industrial revolutions which chemistry was thus bringing about. The loss of indigo and madder cultivation to agriculture was a fundamental loss, for the raw material from which these dyestuffs are synthesized is coal tar—a substance of mineral, not agricultural, origin.

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### Greater Achievements in Prospect

The ability of man to duplicate the products of nature in the future gives promise of even greater accomplishments than those that have been mentioned. The production of organic chemicals as a permanent outlet for agricultural raw materials would, therefore, appear at first sight to be somewhat hazardous, for no one can foretell the consequences of the new discoveries in chemistry. Industry will always seek the cheapest source of its raw materials, and the prices which the agriculturalist receives for his product must be sufficiently low to withstand the competition of synthetic chemistry. This challenge to the agriculturalist has been very strongly stated by a recent writer.

Either the prices of farm staples must be low or these new organic syntheses come into play. In other words, methanol, ethyl alcohol, formic acid, acetic acid, and many other compounds are readily procurable from the elementary sources of coal and petroleum which bid fair to displace the vegetable sources of present supply. Certainly it behooves those in agriculture to ponder well the outcome of this gigantic impending battle, and to keep ever before them the fact that throughout man's competition with Nature, synthetic chemistry has never lost a battle. In the light of modern advance in organic synthesis it is not at all unthinkable to picture the complete demolition of crop cultivation.

The picture as thus sketched is, however, somewhat overdrawn. Although it is true that man has succeeded in synthesizing upon a profitable commercial basis a number of organic compounds hitherto obtained from plant materials, the record of such victories is small in comparison with the immense number of substances used in industry, medicine, and the arts for which man must still go to nature. fact the more serious thinkers among chemists recognize a limitation of man's powers and admit the impossibility of ever synthesizing so complicated a compound as insulin, or egg albumin, with molecular weights as great as 35,000. While the chemist, to an increasing degree will add to the number of his successes in the field of organic synthesis, mankind for many centuries to come must continue to rely upon plants and animals for his supplies of protein, oils and fat, starch, cellulose, and many other necessities, not to forget some of those more elusive but highly essential minor food constituents such as the vitamins.

### Farm Uses for Residues

Supplying our population with the basic necessities of food, clothing, and shelter, will continue, as in the past, to be the main object of agriculture, and the production of useful chemicals from agricultural raw materials will be largely confined to the utilization of the straw, stalks, chaff, culls, residues, and other by-products of the farmer's occupation. Even in the case of these residues the farmer must carefully determine whether they are not of more value to himself when converted into cattle feeds, fertilizers, or humus than when sold as raw materials for the manufacture of xylose, furfural, methanol, acetic acid, or other chemicals. Using them upon the farm as cattle feed or compost may in the end be more remunerative than selling to industry for a small pittance of cash.

Methods of using the cereal straws, the world's most abundant agricultural by-product, have attracted the most attention from chemists. In Europe straw is utilized upon the farm for composting, for thatching haystacks, barns, and other buildings, and also as a

cattle feed, for which purpose it has been subjected to various chemical treatments for increasing its digestibility. Straw is also used in Europe for manufacturing low-grade papers and is compressed into panels which are sold under the name of "thatchboard" for constructing the walls and partitions of buildings. Straw and cornstalks are also converted into building and insulating boards in the United States, but as raw material for this purpose they must compete with the waste of lumber mills. The destructive distillation of straw and cornstalks in producing carbon, illuminating gas, methanol, acetic acid, and other substances has also been done in the United States but not with complete economic success, since these products can be made more cheaply from other sources.

The most perfect chemical means for working up straw, stalks, hulls, and other cellular residues is the one that utilizes most completely each one of their three major components—cellulose, pentosans, and lignin. An estimate of the potential sources of cellulose, pentosans, and lignin in a few of the common agricultural residues of the United States is given in Table 11.

Table 11.—Potential yields of cellulose, pentosans, and lightn in several agricultural residues of the United States

Raw material	Annual production	Cellulose		Pentosans		Lignin	
Ceical straws	Tons 115, 000, 000 100, 000, 000 20, 000, 000 15, 000, 000 1, 800, 000 2, 200, 000 2, 200, 000 70, 000	Per cent 40 50 40 12 40 35 50 50	Tons 46, 000, 000 50, 000, 000 8, 000, 000 7 560, 000 720, 000 1, 100, 000 250, 000 28, 000	Per cent 25 21 35 22 38 37 19 29 18	Tons 25, 750, 000 21, 000, 000 7, 000, 000 4, 500, 000 651, 000 1, 110, 000 418, 000 140, 000 12, 600	Per cent 20 20 20 25 25 25 22 30	Ton \$ 23, 000, 000 20, 000, 000 4, 000, 000 4, 500, 000 510, 000 510, 000 110, 000 21, 000

This rough compilation is far from complete, as it does not include potato vines, weeds, and many other forms of residues which are ordinarily burned as trash. The figures are sufficient, however, to give an idea of the immense resources of cellulose, pentosans, and lignin in the agricultural waste materials of the United States. Of these three ingredients the market for cellulose as a raw material for the manufacture of paper, rayon, nitrocellulose, and other industrial products, is at present the most extensive. The market for pentosans as a raw material for the manufacture of adhesives, xylose, and furfural is very restricted. Sufficient xylose can be made from a few tons of corncobs or out hulls to satisfy the present demands of the world for many years. One of the greatest services which the chemist can render agriculture is the discovery of new industrial uses for xylose and furfural, millions of tons of which can be manufactured each year from the pentosans in the residues of our cereal and other crops.

## Lignin Market Limited as Yet

Lignin, the third major constituent of the straw, stalks, hulls, and other cellular wastes of agriculture, has at present a very limited market as a raw material for industrial utilization. The ultimate possibilities in this direction seem, however, to be very great, and with reference to the utilization of lignin, synthetic chemistry stands to-day in about the same position as it stood over a century ago with reference to the utilization of coal tar in which such brilliant industrial achievements were later attained.

There is reason to suppose from the nature of its decomposition products that lignin may be the parent substance of the tannins, the flavones, the essential oils, and many other valuable aromatic constituents of plants. It remains for the chemist to discover the methods which the plant employs in converting lignin into these other substances and to duplicate them upon a large industrial scale. The working out of industrial methods for converting lignin into tannin would be of especial advantage not only for the utilization of a waste product but also for its aid in relieving the pending shortage of vegetable tanning materials. Experts of the Bureau of Chemistry and Soils are at present engaged upon this very important practical problem.

The monetary returns from the chemical utilization of agricultural by-products alone do not as a rule repay the expenses of production. They do, however, contribute substantially to increasing the total profits of a crop and have frequently helped to turn a deficit into a profit. Increasing the number of ways in which the products and by-products of agriculture can be utilized increases correspondingly the number of outlets into which crops may be diverted in times of

surplus and overproduction.

The testing of the multitude of chemicals obtained from agricultural products for industrial uses is constantly disclosing unsuspected possibilities in their utilization. Ursolic acid, a new substance isolated from apple skins, by one of the department's chemists, has been found to greatly improve the gloss, water resistance, and brushing quality of cellulose lacquers. If there should be sufficient demand for this new chemical it would be possible to produce 500,000 pounds of it annually from the apple skins and pomace from cider factories, canning plants, and dehydrating establishments.

## Even Weeds May Be Utilized

Even the weeds on the farm offer possibilities of chemical utilization. It has been demonstrated that goldenrod, one of the most widely occurring weeds in the United States, can serve as a raw material for the production of rubber. Neonicotine, a new alkaloid with valuable insecticidal properties, was first prepared synthetically from pyridine by one of the department's chemists. It has since been dicovered as a natural constituent of the weed Anabasis aphylla, which grows plentifully in the eastern Mediterranean countries. This is one of the rare instances of the synthesis of a compound preceding its discovery in nature. It is as yet too early to predict whether the synthetic or the natural form of this new insecticide will establish commercial supremacy. In this connection it should be remembered that the ability of a plant to produce a chemical can be improved by propagation. The ancestral form of the sugar beet was an insignificant weed, its original 5 per cent or less of sugar having been increased by selective breeding to nearly 20 per cent.

Future developments in the chemical utilization of the surpluses and wastes of agriculture are dependent (1) upon creating new uses for the immense quantities of cellulose, starch, sucrose, lactose, xylose, furfural, acetic acid, oxalic acid, methanol, alcohol, and other substances which can be obtained by known methods from our present reserves; (2) upon discovering new methods for converting lignin and other undeveloped plant constituents into useful chemical derivatives. The synthetic chemist should be viewed by the agriculturist not as an enemy who is to accomplish "the complete demolition of crop cultivation" but rather as a valuable collaborator who will help the farmer to derive greater profits from the residues which at present are wasted or only imperfectly utilized.

C. A. Browne, Bureau of Chemistry and Soils.

## CITRUS BY-PRODUCTS MARKET IS GROWERS' SAFE-GUARD IN YEARS OF OVERPRODUCTION

Citrus fruit trees were brought to Florida by the Spanish padres several centuries ago, but the citrus industry is of much more recent origin. It was well into the latter half of the last century that commercial shipments in this country were well established, and it is only within the last 50 years that the industry has been on a substantial basis. In 1899, about 6,000,000 boxes of oranges, 30,000 boxes of grapefruit, and 900,000 boxes of lemons were shipped from California and Florida. In 1930, about 48,000,000 boxes of oranges, 14,000,000 boxes of grapefruit, and 7,000,000 boxes of lemons went to market from the citrus-growing States.

This enormous increase in production has naturally been accompanied by not a few problems. Among the most serious of these has been the utilization of the surplus and cull fruits. As production increases, the proportion of unmarketable fruit also increases, and as the saturation point of consumption is approached, there is great danger of loss on fruit in the lower grades. An unusually large crop is a disaster if no means are provided for keeping the low grades of fruit

from the market.

A cooperative by-product industry can go a long way toward stabilizing markets at any time, but in years of overproduction, it becomes the only salvation of the grower. A striking illustration of this took place in 1927 in the lemon industry. With the consumption in the United States and Canada of less than 15,000 carloads, all but 2,000 of which came from California, the lemon growers of that State were faced with the problem of disposing of 6,000 additional carloads. Not only was this amount of fruit, 78,000 tons, handled by their by-product company with a satisfactory return to the growers, but nearly 13,000 carloads were marketed, with a gross return exceeded but once in the history of their cooperative enterprise. Had 1,000 carloads of the fruit which was turned into by-products been placed on the market, the crop would probably have yielded one of the poorest returns on record.

### Lemon Growers Were the Pioneers

Curiously enough, the smallest group of citrus growers, those raising lemons, were the first to make a start toward solving the surplus and cull problems. The greatest consumption of oranges and grapefruit

has been during the winter and early spring months, whereas lemons are consumed largely during the summer Their consumption depends upon weather conditions more than does that of other citrus fruits. A heavy crop of lemons coincident with a mild, cool summer meant disaster to the lemon growers before the by-product enterprise was established. Beginning in a small way, handling about 5,000 tons of lemons in 1917, the capacity and usefulness of this cooperative enterprise increased until, in 1927, the growers handled the largest amount of cull and surplus fruit ever produced in California. This fruit was converted into citrate of lime (from which citric acid is produced),

essential oil of lemon, and pectin.

Citric acid is used in beverages, soda-water sirups, effervescent salts, and citrate of magnesia. The consumption is about 6,000,000 to 8,000,000 pounds per annum, of which about 20 to 25 per cent is supplied by citrus by-products operators. Essential oil of lemon is used for flavoring purposes and to a less extent in perfumes. Most of it is imported from Italy, about 1,000,000 pounds coming in annually. California produces about 10 per cent as much. Pectin is used by the manufacturers of jams and jellies to produce a satisfactory consistency in their product. It is contained in the peels of citrus fruits. The annual production is a matter of doubt as it is seldom sold pure, but, for the purpose of standardization, is either in solution in water or mixed with sugar. The citrus-fruit growers have sufficient material available to produce pectin to supply the world's demand.

Growers of oranges were slower in starting their by-products factory, but they too have come forward rapidly within the last few years. After failure to market orange marmalade on a scale that would use any considerable amount of fruit, attention was turned to other products, and a satisfactory business has been built up in making concentrated orange juice, essential oil of orange, and pectin. Carbonated orange beverages are popular, and large quantities of these products are consumed throughout the country. Recently, frozen orange juice has been made in Florida and California on a large scale, and quantities of surplus fruit have been used in this way. Several companies are doing a gross annual business of \$1,000,000 each in orange by-products.

## Grapefruit Culls Utilized

By-products from grapefruit have so far been confined largely to the canned fruit and the canned juice, but as 25 to 50 per cent of the entire crop is annually consumed in this way, the culls, consisting of misshapen, thick-skinned, and otherwise unmarketable fruit, are returning something to the growers. Grapefruit peel contains both essential oil and pectin, but there has been no commercial production of either from this source.

Up to the present the oranges and lemons used for by-products do not return to the grower the cost of production, and no grower contemplates growing the fruit for by-product purposes alone. The actual cost of growing lemons in California is about \$35 a ton, but returns of more than \$25 a ton from by-product utilization are rare. Although the cost of producing oranges is somewhat less than that of producing lemons, the returns from their use as by-products are not enough to pay for growing the fruit. Canned grapefruit will probably come nearer to paying its way than will the by-products of either of the other citrus fruits.

E. M. CHACE, Bureau of Chemistry and Soils.

## LIGNIN, FARM BY-PRODUCT, NOW WASTED, MAY SUPPLY CHEAP ORGANIC CHEMICALS

The various by-products of the agricultural industry, such as cereal straws, cotton stalks, corn stalks, and hulls, are composed principally of carbohydrates, chiefly cellulose and pentosans, and a substance called lignin. The quantity of lignin in the agricultural by-products listed above ranges from about 15 to 20 per cent of the dry weight of the materials. Approximately 225,000,000 tons of these agricultural by-products are produced annually on the farms of this country. This gives some conception of the potential supply of this substance. In addition to this, about 1,200,000 tons of lignin are produced annually in the paper mills of this country as a by-product in the preparation of wood pulp. At present most of this lignin is wasted.

The fact that lignin now constitutes an enormous industrial and agricultural waste, and because of its inherent possibilities as a cheap and abundant source of organic chemicals, has stimulated great research activity all over the world on its fundamental chemistry. It is now generally recognized among students of this subject that only after a proper understanding of the chemistry of lignin will it be possible to develop a rational program for its economic utilization. Attempts to utilize lignin by empirical methods, which were used in the past, have

met with failure.

## Lignin Related to Phenols

Investigations on the fundamental chemistry of lignin conducted by the Bureau of Chemistry and Soils have shown that the substance is chemically related to phenols. In view of the fact that ordinary phenol or carbolic acid is now used extensively in the preparation of synthetic resins, it seemed, by analogy, that lignin also would yield synthetic resins. As a matter of fact, it was found that under suitable conditions lignin will combine with furfural and with aromatic amines, such as aniline, dimethylaniline, ortho and para toluidine, cymidine, ortho and para nitraniline, meta toluylenediamine, benzidine, tolidine, and alpha and beta naphthylamine, forming resinous products that range in color from brown to black. Tests conducted on these resins indicate that they may be used in the preparation of varnishes. All the resins, with the exception of that obtained from furfural and lignin, belong to the soluble and fusible type.

When lignin is subjected to dry distillation it yields a series of organic compounds, such as guaiacol, creosol, normal propyl guaiacol, catechol, and vinyl guaiacol. Most of these substances possess antiseptic properties, and some of them, like guaiacol and catechol, are used to a considerable extent in the pharmaceutical and chemical industries. In addition to these compounds, other organic substances, such as wood alcohol, acetone, acetic acid, and anisic acid, have been obtained as

products of distillation.

With the broadening of our knowledge of the fundamental chemistry of lignin, further developments in its economic utilization may be anticipated.

MAX PHILLIPS, Bureau of Chemistry and Soils.

# FURFURAL, A PRODUCT OF FARM WASTES, HAS MANY INDUSTRIAL USES

The name "furfural" is derived from that of another farm by-product. One of the early investigators of furfural, which was first obtained in 1830, prepared it from bran and gave it its name, the literal translation of which is "bran oil." All farm wastes are composed chiefly of cellulose, lignin, and pentosans. Furfural is made from the pentosans. It may be produced by moistening ground corncobs with acid and water and heating the mixture. Furfural and water distil off

together, and the furfural is then separated from the water.

Although furfural has been known for many years, it was until recently only a chemical curiosity selling for \$30 a pound, at which price it was obviously of no concern to industry. About 10 years ago the problem of its production was taken up in the Department of Agriculture, and studies of the possibility of manufacturing it from corncobs were made. Yields were investigated, and special apparatus was devised. These studies demonstrated that furfural might be produced for industrial uses at a price which would make it readily available. As a result, the commercial manufacture of furfural from oat hulls was started, and it is this development which is responsible for the present production of furfural for the market. As a raw material, out hulls are preferred to corncobs, chiefly because they are already in the factory as a by-product from the production of various foods. Since the cost of collecting is one of the biggest items of expense in the industrial use of any farm waste, the fact that out hulls are on hand makes them a cheaper raw material.

Beginning with the first production of furfural for the market, up to and including 1929, its production has doubled every year, with a corresponding decrease in price, so that it can now be obtained in large

quantities for about 10 cents a pound.

### Commercial Uses of Furfural

Furfural has found a number of commercial uses. First and most important is its use in the manufacture of synthetic resins. When furfural is combined with a number of coal-tar by-products and heated, it forms a hard, shiny material which can be molded into various shapes. This is especially useful because of its insulating value. As furfural is rather unstable and becomes discolored when exposed to the air, it is not suited to the production of the lighter-colored resins. It is an excellent preservative, though its susceptibility to discoloration precludes many uses of this kind. Furfural is also employed commercially as a solvent. It is of value in the purification of rosin, because the impurities which discolor rosin in the natural state are highly insoluble in furfural. It is claimed that it may be similarly employed in the purification of anthracene, an important raw material for vat dyes. Furfural has been recommended as an ingredient of commercial lacquers, and it is now being used to a certain extent in the preparation of these substances. It also forms a number of compounds which can be used in the manufacture of rubber. A number of dyes have been made from furfural, but these are inferior to those made from other materials now in use. Furfural is an outstanding example of the possibilities that lie hidden in the by-products of the farm.

H. T. HERRICK, Bureau of Chemistry and Soils.

# UTILIZATION OF STRAWS AND STALKS LAGS AS OTHER MATERIALS COMPETE

In the production of the great staple crops, the small grains, the cotton, the sugar, and the timber of this country, there necessarily is grown an equal and usually greater tonnage of straws, stalks, cane, lap wood, and bark, for which in the main there is no large use, except as roughage, as fuel at the sugar houses, and in maintaining the fertility of the farm. A comparatively small percentage is sold for industrial uses, such as bedding for animals, paper making, board making, tanning, and the production of certain chemicals, such as acetic acid, alcohols, acetone, charcoal, and wood oils.

Practically ever since its organization the Department of Agriculture has been investigating methods of utilizing these waste products of the farm, and has been familiar with the efforts of others to develop uses for them. The fact that production of the staple crops which are the backbone of American agriculture, has increased, that prices are below the cost of production, that the farmers themselves are in the most difficult economic position occupied by any class of American people, has led again to an intense effort to utilize more extensively in industry the by-products of the farm, and has caused increased research and informational activity in the Department of Agriculture.

If and when they can be profitably and competitively utilized industrially, these farm by-products will have great value. The straws of wheat, oats, barley, rye, and rice, the stalks of corn and sugarcane, and the wild marsh grasses produced in this country annually, probably exceed 260,000,000 tons. This tremendous quantity of lignocellulose material is more than enough to make all the paper, fiber board, acetic acid, alcohols, acetone, and charcoal required by this country. At present these commodities are being made mostly from other raw materials, principally wood and corn, and under present economic conditions they can be produced more economically from those materials. Potentially, farm and town buildings can be lighted, and cooking can be done, with fuel made from farm by-products. Then why isn't it done? Why has not the Department of Agriculture, which has known of these problems for 50 years or more, solved them and pointed the way to the profitable utilization of these wastes?

#### No Market as Yet

Each year top and lap wood, and tan bark having a potential or theoretical value of millions of dollars, rot or burn on the farms or in the forests of this country. Again, why? The answer is clear cut and conclusive. With the exceptions cited below it does not pay to gather these wastes and try to sell them. There is no market for them. Nobody wants them because the things that can be made from them can be made more economically and more easily from something else.

When these wastes have a market use it is limited and is readily supplied by only a small percentage of the amount available. This is the case of waste woods used in making paper, insulation board, acetic acid, wood alcohol, acetone, charcoal, and wood tars; waste barks used in tanning; straws used in making straw and insulation board, and sugarcane and cornstalks used in making insulation board. The

total quantity of these wastes used industrially is almost negligible,

and it yields the farmer but little profit.

The only industrial outlets for the above-mentioned farm products that have so far proved practicable and that give promise at this time of continuing are the utilization of waste woods for paper and board making and for certain chemicals; and to a limited extent the utilization of waste barks and woods for tanning and of waste straws, cornstalks and sugarcane stalks for making box, insulation, and building board.

Apparently these uses have possibilities of growth and perhaps of tremendous expansion. Other potential uses, although viewed with longing eyes by the farmer, and attractive and stimulating to the research worker, must await further development or perhaps more favorable economic conditions before the Department of Agriculture can recommend them to the farmer or to the business man. The Bureau of Chemistry and Soils and other bureaus of the department are constantly seeking profitable industrial uses for the by-products of the farm and forest, and will promptly make such uses known when they are developed.

F. P. VEITCH, Bureau of Chemistry and Soils.

# SWEETPOTATOES YIELD FINE WHITE STARCH BY A NEW PROCESS

Although cornstarch dominates the starch market in the United States, there is still a consistent demand for some other starches, which, on account of their distinctive properties, are preferred for certain purposes, those of high quality often bringing a premium. In this group are potato and cassava starches, of which there is imported each year an average of approximately 130,000,000 pounds, having a value exceeding \$6,500,000.

In any plan for utilizing a farm crop as a source of starch, it is best to consider the possibility of producing a starch that will compete with imported rather than with domestic starch; furthermore, those crops which are now produced in abundance, or which could easily be expanded, should be considered before introducing a crop the success of which might be in some doubt. From this standpoint the principal crops of consequence from which starch could be produced in competition with imported starch are potatoes and sweetpotatoes.

## Methods of Utilizing Cull and Surplus Potatoes and Sweetpotatoes

The problem of profitably utilizing cull and surplus potatoes has received the attention of several investigators, but no entirely satisfactory scheme has been evolved. The potato-flour industry which sprang up as a result of war conditions has now largely disappeared because of limited demand. Canning has held some promise as a means of utilizing both oversize and undersize cull sweetpotatoes, but since fresh potatoes are now available during practically the entire year as a result of improved methods of storage and distribution, the average yearly pack of canned sweetpotatoes appears to be declining. The production of sirup from sweetpotatoes has been suggested, but

has not proved to be commercially practicable. The use of cull potatoes as stock feed, particularly for hogs, has some merit but, in general, the centers of hog production and of potato production do not coincide, so that this method of utilization is limited. The possibilities of utilizing the cull and surplus portions of these crops are thus apparently narrowed down to the production of starch or its derivatives.

In contrast to the practice in European countries where potatoes constitute the principal source of starch, there are in this country only a few small and simply equipped potato-starch factories. In view of certain factors, such as the premium in price at which potato starch of high quality sells, the extent of importation of potato starch, the recent increase in the tariff rate, and the possibility of utilizing sweet-potatoes as well as potatoes, it would seem practicable to extend the potato-starch industry in this country, particularly for production of high-grade starch. Locating starch factories in overlapping production areas of these two crops should aid materially in stabilizing the supply of raw material and in extending the manufacturing season, thus remedying two conditions which have been regarded as serious

obstacles to an extension of the potato-starch industry.

Heretofore when the potato-starch process has been used, difficulty has been experienced in consistently obtaining a prime white starch from sweetpotatoes. As a result of recent investigations by the Bureau of Chemistry and Soils, it is now possible to produce a white starch of high quality from sweetpotatoes of any variety. It was found that objectionable pigments may be eliminated by a process which is somewhat similar to that used in the production of cornstarch and which involves the use of sulphurous acid and caustic soda. The principal function of the sulphurous acid is to keep certain pigments associated with the starch in reduced and colorless condition and to prevent oxidase action which is accompanied by pronounced darkening of the extraction liquors. The function of the caustic soda is to extract, after treatment with sulphurous acid, certain pigments which affect the quality of the starch.

## Process for Sweetpotato Starch Production

The process of producing starch from sweetpotatoes consists of the following steps: The sweetpotatoes are washed and transferred to a grinder, where, after the addition of a 0.15 per cent sulphurous acid solution, they are pulped. Shaking or brushing screens are used for separating the starch from the pulp which, for high extraction, is again ground and rescreened. The separation of the starch from the water may be accomplished by allowing it to settle in tanks or tables, but it is preserable to use a continuous centrifugal machine. The starch is purified by being retabled two or three times and afterwards receiving a carefully controlled alkali treatment. The starch is stirred with the alkali for a few hours, after which it is allowed to settle overnight. It is then suspended in clean water, retabled, filtered, and thoroughly washed. In order to insure neutralization of all the alkali, the starch is suspended in a very weak acid solution (sulphurous or acetic acid) and is again filtered and washed. The starch from the filter is then ready for drying, after which it may be ground, sifted, and packed.

A complete pilot starch plant, erected by the Bureau of Chemistry and Soils at the Atlington Experiment Farm at Rosslyn, Va., has been



FIGURE 202 — Experimental starch plant, Arlington Experiment Farm, Va., showing tower tank, vacuum-filter outfit, tables, large tank and steep tink, and brushing screen

used to test thoroughly the process described above. A general view of the equipment is shown in Figure 202.

### Properties of Sweetpotato Starch

The starch granules of sweetpotatoes are considerably smaller than those of potatoes, and a little larger than those of com. Sweetpotato starch has a rather high gelatinization temperature and pastes prepared with water are much more stable on long heating than are potato-starch pastes. This is a valuable property in the sizing of cotton textile goods. The alkali pastes of sweetpotato and potato starches are about equally viscous. Sweetpotato

starch made by the method described was approximately equal in purity to commercial starches of the finest quality found on the market.

R. T. BALCH and H. S. PAINE, Bureau of Chemistry and Soils.

# FREEZING TO PRESERVE VEGETABLES AND FRUITS STILL IN PIONEER STAGE

The natural preservation of plant and animal tissue by freezing was undoubtedly observed by man for centuries before he discerned in this phenomenon anything useful in his daily life. In historical times atmospheric low temperatures, snow, and ice, began to be used for the cooling of foods and drinks to temperatures that made them more agreeable to the taste, discouraged development of the organisms of spoilage, and delayed decomposition.

For many years these natural refrigerants have been used more or less satisfactorily. Recent progress in mechanical refrigeration, together with changes in modern food-distribution practices, has greatly popularized the idea of everyday domestic refrigeration and has now

brought preservation by freezing into striking prominence.

The youth of this industry, as compared with the century of experience gained by the canning trade, which employs heat as the preserving agent, will suggest that the pioneering stage has not yet been passed. Many problems remain to be solved or are only partly understood. The stimulus for sustained and enthusiastic public interest in this new business arises partly from the fact that, in many instances, freezing preservation enables the consumer to have horticultural products in a condition as nearly equal to their fresh state as it seems possible to obtain them by any preservative means.

As a first consideration in successful preservation by freezing, emphasis must be laid upon the close relationship between the horticultural character, varietal peculiarity and maturity of the raw materials, and the final quality of the finished product. Fully ripened, sound fruits, washed in clean water and prepared for freezing under sanitary conditions with a minimum of delay, are essentials to a satis-

factory product intended for freezing preservation.

Fungi, yeasts, and bacteria are almost universally present on fruits and vegetables in their natural state, and the activities of these as well as the life processes of plant tissues are materially hastened by higher temperatures such as generally prevail during the packing of the products. Hence any reduction in air temperatures, particularly to 40° F. or below, during the time required for preparation of the material is distinctly helpful.

Freezing temperatures do not necessarily terminate these life activities but do very materially retard them. When thawing takes place, some of these processes may be resumed with equal or even greater intensity than before freezing occurred. Discoloration of plant tissues by oxidation is such a phenomenon, one of much commercial significance, particularly for frozen fruits in small containers.

## The Lessening of Discoloration

This discoloration may be prevented or lessened by several means, some of which are designed to exclude atmospheric oxygen from contact with the tissues, or to inactivate the organic ferments responsible for discoloration. The choice of a variety of fruit or vegetable best suited to freezing preservation may be very helpful not only in minimizing oxidation in fruits but also in improving the texture and the desirable culinary and dessert qualities of frozen horticultural products generally.

Blanching treatments at moderately hot temperatures have been effective in lessening the decomposition in freezing storage of such vegetables as peas, in improving the texture of spinach held at freezing temperatures, and in reducing the activity of oxidation ferments in

such fruits as apricots and peaches.

Exclusion of air from the product is accomplished by a relatively high vacuum closure of glass or tin containers or by replacing the air in the head space by some gas such as carbon dioxide or nitrogen, the presence of which tends to suppress the activities of the organisms requiring air for life and development as well as to inhibit the completion of the oxidation cycle.

### The Use of Sirups

Covering fruits with sirups of 40 to 65 per cent concentration while the temperature of the products is being lowered, has several advantages. The sirup tends to exclude air from the fruit surface, and in the case of small fruits such as strawberries and raspberries it makes less essential the use of a vacuumized container to prevent discoloration of the product. (Fig. 203)

With some vegetables such as peas and beans a relatively weak brine, similar to that used for the product in heat processing, has been found to give a product superior in texture and culinary quality.

Sirup, if the concentration is fairly high, protects the fruit product against fermentation and spoilage. The natural color and flavor of many fruits seem to be better retained when sirup or sugar is present, and as a result of the gradual removal of water from the tissues, due to the action of the sirup on them, the fruits seem to be better prepared for the extraction of water, which takes place with some rapidity when ice formation sets in. As a result of this, the texture of the frozen product is improved when the fruit is thawed before it is used.



FIGURE 203 -Strawbernes and peaches frozen in strup

Although considerable discussion has recently been devoted to the merits of very rapid freezing in producing frozen horticultural products of high quality, there is some evidence that other factors besides the size and frequency of the ice crystals in the tissues are important in determining the ultimate quality of the product. In addition, very rapid freezing of plant products generally requires relatively expensive refrigerating equipment. It has been found from experience with the product after it is frozen as well as from the standpoint of economy that the use of temperatures of 0° to 10° F. for freezing horticultural products in small containers is preferable to the use of lower temperatures. This is particularly true when the freezing operation is so modified that the containers are exposed individually to the refrigerant, and preferably while in motion, thereby facilitating heat transfer from the product to the freezing medium, inducing relatively quick and even ice formation and allowing a satisfactory distribution of the sirup or brine in the product.

The best storage conditions for frozen plant products are not completely understood, but experience has shown that temperatures of

10° to 15° F. are reasonably satisfactory for most purposes.

## Slower Progress in Vegetable Freezing

While the freezing of fruits such as strawberries, raspberries, and some varieties of cherries in small containers has been done commercially for several years, and even such light-colored tree fruits as apples, apricots, and peaches can now be purchased frozen in the food markets of the country, the freezing preservation of vegetables has gone ahead more slowly. The main reason for this is probably the present lack of information on the behavior of certain food-poisoning bacteria, such as the one causing botulism, when exposed to the temperatures and other conditions of freezing preservation. There is some evidence that freezing may weaken or kill the microorganisms responsible for fermentation and spoilage in frozen fruits. In the absence of such information about the spoilage organisms in vegetables it is safer to pack such products for freezing only under carefully supervised conditions and only where they will be marketed under conditions permitting the education of the consumer in correct methods of handling and utilizing the frozen food.

The proper distribution and use of frozen fruits and vegetables involves such distinctly new viewpoints of food utilization that it is probably desirable to exercise some restraint in applying this new method, and thus to avoid costly mistakes and wasted effort. Research and experience over a period of years should gradually make it possible for this young industry to develop to the proportions that

its usefulness deserves.

H. C. DIEHL, Bureau of Plant Industry.

# FRUIT PRESERVATION BY FREEZING PRESENTS MANY PROBLEMS FOR RESEARCH

Small fruits preserved by freezing storage more nearly approximate the fresh fruits in color and flavor than do fruits preserved by other means. Preservation by freezing began about 20 years ago when the berry packers of the Pacific Northwest started experimenting with the preservation of berries by the frozen-pack method. This consists essentially in placing the fruit in barrels or other containers, with or without sugar, then freezing and storing the pack at relatively low temperatures—about 0° F. or a little below for the freezing and about 10° for storage. Most of the berries thus preserved are used in preserves, jellies, jams, marmalades, soda-fountain supplies and ice cream, and in pies and other pastries. More than 100,000 barrels of the 50-gallon size are being sold annually. The popularity of the frozen fruit is well attested to by the fact that of approximately 17,000,000 pounds of cherries handled by one of the Wisconsin fruit growers' unions in 1930, only about 8,000,000 pounds were sold as fresh fruit.

A great deal of research on preserving fruits by freezing has been done in the last two years. Fruits put up in containers holding 1 pound and less have appeared on the market. There has been a tendency to freeze these small containers at lower temperatures, anywhere from  $-20^{\circ}$  to  $-50^{\circ}$  F., as quick freezing retards enzymatic processes and also forms small ice crystals, which do not injure the tissues so much as do the larger crystals formed by freezing at higher tempera-

tures.

Freezing does not kill bacteria, yeasts, and molds, which are among the causes of spoilage in fruit, but it arrests their development, and as long as the product is kept frozen they do not become active.

A great deal is still to be learned about preserving fruit by freezing. There is as yet no common agreement on the best temperatures for freezing and storage, and at present all fruits do not lend themselves readily to freezing storage. Methods of retail distribution must also be worked out. The technological phases of the problem are being investigated by the Bureau of Chemistry and Soils.

ROBERT P. STRAKA, Bureau of Chemistry and Soils.



## FERTILIZER INDUSTRY MAKING ADJUSTMENTS TO COM-PLEX ECONOMIC REQUIREMENTS

Fertilizers as a means of increasing total crop production have little appeal under present conditions of agriculture, with large surpluses being produced in many instances at a cost exceeding the value of the products. As a means, however, of reducing the cost of production, they are of special interest. That the cost of fertilizers to the farmer might be reduced, the elimination of inert materials accompanying the plant food elements has long been advocated; but, primarily because of the nature of the materials available, this could not be accomplished. Improvement in commercial fertilizers has gradually gone forward but the greatest advance has been made since the World War.

The earlier industry was founded on the exploitation of natural deposits of phosphates, nitrates, and potash, and on the utilization of waste or by-products from other industries, so that the technology of the industry prior to the twentieth century consisted principally of hand mixing of the various available materials. The only chemical process involved was the manufacture of sulphuric acid used in converting phosphate into superphosphate. The principal part of the industry was in assembling and mixing the materials and in distributing the products. Mcchanization of the plants and, in many instances, combination of sulphuric acid and superphosphate manufacture with mixing and distribution plants, were natural steps in the development.

### Character of Goods Produced

Under this system the total of plant-food constituents in mixed fertilizers was limited to about 20 per cent because of the low percentage of these constituents in many of the basic materials, none of them carrying over 20 per cent with the exception of some of the potash salts. The treatment of phosphate rock with sulphuric acid gave a product with one-half the phosphoric acid content, diluted with calcium sulphate. Materials obtained as by-products from other industries were diluted by accompanying substances, which in the great majority of cases were of little crop-producing value. When more concentrated materials were available, the mixtures were diluted with filler to make them correspond to the customary formulas.

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### Influence of Nitrogen Fixation

The Fertilizer and Fixed Nitrogen Unit of the Bureau of Chemistry and Soils and its predecessors in the Bureau of Soils and the Fixed Nitrogen Research Laboratory, have been engaged for a number of years on problems involved in the production of concentrated fertilizers, including the fixation of nitrogen and the conversion of nitrogen products into substances suitable for fertilizers. The development of nitrogen fixation since the war has exerted a profound influence on the fertilizer industry and is transforming it into a chemical manufacturing industry. Before the war calcium nitrate and calcium cyanamide were the only fixed-nitrogen products entering American fertilizers, but since they could be used in only a limited amount, their effect on the industry was small. Since 1918, however, the production of ammonia by the direct synthetic method has made it possible to prepare a number of materials of high concentration containing one, two, or even all three of the principal fertilizer elements. The products from the nitrogen-fixation industry are characterized by concentration. Ammonia is the most concentrated nitrogen product, but since it can not be employed directly, it is transformed into products suitable for fertilizer use. By oxidation it is transformed to nitric acid. From nitric acid, with limestone, calcium nitrate is formed; and with soda ash, synthetic sodium nitrate. Ammonium nitrate is formed by combination of ammonia with nitric acid, or ammonium sulphate with sulphuric acid, and ammonium phosphates with phosphoric acid. Various combinations of these with each other and with potash salts are being produced or are suitable for utilization as fertilizers.

The development of more concentrated phosphates has been going forward simultaneously. The production of triple superphosphate for fertilizer use has been a reality for years and the production of phosphoric acid both by furnace processes and by chemical means gives promise of its more extensive employment in the near future as a carrier for the other two fertilizer elements. This use is already an actuality, but expected developments in the production of cheaper phosphoric acid will accentuate the employment of ammonium and potassium phosphates and similar compounds. A further recent development has been the direct addition of ammonia to superphosphate, whereby part of the phosphate is transformed into ammonium phosphate. The addition of ammonia is limited to rather small percentages

but the increase in plant-food content is quite advantageous

## Higher-Analysis Fertilizers

The availability of more concentrated materials is resulting in the production of mixed fertilizers of higher concentration. While it was not advantageous and often not possible to make mixed goods of high concentration with materials from the older sources, with the new synthetic materials, mixtures carrying as much as 70 to 75 per cent of plant food may be made. A change to the production of more concentrated fertilizers is taking place as is evidenced by the fact that the average plant-food content of fertilizers in the United States in 1914 was about 12 per cent, while in 1930 it was 18 per cent. (Fig. 204.) This 50 per cent increase in plant-food content represents an increase of 486,500 tons of actual plant food in the fertilizer consumed in 1930 over what would have been contained in the same tonnage of

12 per cent fertilizer. Or it means some 4,000,000 fewer tons of mixed fertilizer to handle and on which to pay freight, than would have been necessary with 12 per cent goods. At an average freight charge of \$3 per ton, this is a saving of over \$12,000,000 With higher concentra-

tions the savings will be increased

proportionately

### Concentrated Fertilizers

The present day high-analysis tentilizers are only a step in the production of concentrated fertilizers. They may be made up from high-grade materials handled in the same way as the low-analysis goods, but the production of concentrated fertilizers involves new adjustments in manufacture, the solving of distribution and handling problems, the determination of agronomic relations

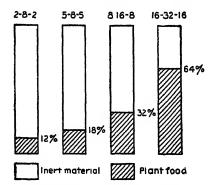


Figure 204—Restive amounts of plant food and mert materials in ordinary, high maly sis and concentrated tertilizers

and the education of the farmer in their use. That these changes are gradually taking place is revealed by a comparison in Table 12 of the new materials with the earlier materials employed.

Table 12.—Comparison of sources, composition, and other characteristics of older and newer fertilizer materials

	Remarks	Naturally occurring, or by-product and wasto materials.  From chemical processes:  Nitric acid added to calcum carbonate.  Nitric acid added to 5 per cent ammonum nitrate.  Nitric acid added to 5 per cent ammonum nitrate.  First fration product used as fertilizer.  Ammonia and carbon diovule.  Trea and calcum nitrate.  Ammonium nitrate added to calcium carbonate.  Ammonium phosphate and sulphate.  Ammonium phosphate and sulphate.  Ammonium phosphate and sulphate.  Ammonium nitrate added to phosphoric acid.  Ammonium nitrates of diammonium choride.  Ammonium nitrates of diammonium phosphate, and ammonium sulphate.  5 for mrea and povessium chloride or sulphate.  5 for mrea and povessium chloride or sulphate.
ц	Potash	Per cent 1 3-2 2 25-4 25 48-51 14-45
Composition	Phos- phoric acid	Per cent 1 1-14 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
	Nıtrogen	11-12-12-13-13-13-13-13-13-13-13-13-13-13-13-13-
	Nource	Chile Gas plants and ceke overs, Animal refuse Oil mills Fish City wate Animal refuse Phosphate rock German mines Germany and United States States Germany and United States Germany G
	Type of material	Colder materials: Sodium nitrate.  Ammonium sulphate. Blood Tankage Cottonsced meal. Fish scrap Bone meal. Fotassium nuriate Potassium nuriate Newer chemical products: Sodium nitrate Do Calctum cranamide Calctum cranamide Trea (Floranid) Calctum nitrate Calcum nitrate

As a chemical industry, the manufacture of fertilizers is related to highly technical processes as the source of materials and to agriculture in the disposition of its products. The industry must meet the competition of older materials as well as that of new chemical processes and better methods of manufacture. The consumption and distribution of its products will be determined by the relation of their prices to those of agricultural products as well as by the efficiency of the goods in crop-producing power, while existence as a chemical industry will depend upon production costs at least as low as those of the natural materials. Intensive study of problems associated with concentration is being made by the Fertilizer and Fixed Nitrogen Unit of the department and by various other agencies in this country and abroad. The preparation of concentrated fertilizers was initiated in this country and their utilization has been taken up in other countries, especially Germany. The advantages of the concentrated materials are apparent, and their extensive employment here will gradually follow the solving of problems encountered under American conditions.

R. O. E. Davis, Bureau of Chemistry and Soils.

# FERTILIZER SOURCES AMPLE FOR MIDWEST, COST CUT BY HIGHER CONCENTRATION

The American farmer, in his agricultural operations, applies 8,000,000 tons of fertilizers annually. It is frequently pointed out that this is an average application of 40 pounds for each acre of land under cultivation in this country, as contrasted with 500 pounds for the Netherlands, where intensive farming is generally followed. But it is not necessary to go to Europe to find comparisons, for in this country there are even more widely divergent fertilizer practices between the Southeast and the Middle West, as illustrated by comparing Florida, with an average of 794 pounds per acre, with Kansas, with an average of only 1 pound per acre.

To account for this wide divergence, many factors must be considered. Some are the nature of crops, soil types, and geographical locations with respect to sources of fertilizer supply. While the staple crops are different in the different regions, yet there are few crops that do not respond to fertilizer use. While there are differences in soil types, yet there are few soils on which fertilizers do not give good results. Native fertility is no absolute safeguard against soil depletion, as has been amply demonstrated in agricultural experience. Unless provision is made for restoring to the land the plant food lost through the activities of various agencies, the best of soils may decrease in productivity through loss of some element of its fertility.

To prevent soil exhaustion is a function of fertilizers. To conserve labor, to permit the production of a crop unit with a reduced land unit and labor unit, in other words, to produce a crop unit at a reduced production cost, is the function of most immediate interest to the individual farmer.

Can there be any geographical limitation to these functions? Are they not of the same importance to the Middle West as to the Southeast? In accounting, therefore, for this wide divergence in fertilizer use, can the answer be found in sources of supply of fertilizer materials, and if so what can be done to meet the latent fertilizer requirements of the Nation's greatest agricultural region?

### Effect of Transportation Costs

It is more than a coincidence that in the Southeast where fertilizers are more generally used, by far the greater part is manufactured from close-by sources of phosphates, in Florida and Tennessee, and of synthetic and by-product ammonia, while at the various seaports, European potash is delivered by low-cost water transportation. It is estimated that the freight paid on the 8,000,000 tons of fertilizers used annually is at the average rate of \$3 per ton. It is obvious that this rate mounts as distribution is attempted over regions more remote from production points.

Using present sources, the Middle West must look to Florida and Tennessee or to a single production unit in Montana for its phosphates, to the Atlantic or Gulf seaboard for its nitrates (although by-product ammonia is obtainable at various points less remote), and for its potash again to the seaboard of the East and South for the foreign product or to California or New Mexico for the domestic. In each case long hauls are entailed. To what extent does this added cost defeat the aim of more general fertilizer use in this region and

how may it be reduced?

The reduction in transportation costs, it is obvious, follows the development of close-by sources as contrasted with remote sources of fertilizer supply. The length of haul, if measured in dollars instead of miles, it is less obvious, is further reduced by increase in concentration, for while freight charges are based on weights, fertilizers are paid for on the basis of analysis. The farmer pays for plant food. He is not interested in carriers, so long as they are noninjurious. Doubling the plant-food content halves the freight charge, and in effect, in terms of dollars, halves the distance over which the product is transported. It may be said that of two fertilizer plants, one selling a 20 per cent plant-food mixture and the other a 40 per cent, other things being equal, the one selling the more concentrated product will be only half as far from the farmer buying this product, wherever located, as the other. And by the same token, the farmer buying the less concentrated mixture places himself at a correspondingly greater distance from his source of supply.

Increasing plant-food concentration, therefore, brings the Middle West farmer closer to the fertilizer resources of the Nation, both in the Southeast and in the Rocky Mountain region. While the phosphate deposits of the Southeast have supplied the requirements of the United States and, until the development of the African deposits, those of Europe as well, and while they have been regarded as being so great that their exhaustion has been of no concern, they are quite limited in extent as compared with the western deposits. Surveys have revealed only 326,000,000 tons in the eastern deposits as compared with 5,000,000,000,000 tons in Wyoming, Montana, and Idaho.

The adaptation of the blast furnace to phosphate reduction as it is being demonstrated by the Bureau of Chemistry and Soils yields phosphorus which is by all odds the most concentrated form for shipping purposes which can be devised. One ton of phosphorus represents the plant-food content of 14 tons of 16 per cent superphosphate. At the same freight rate, a ton of phosphorus located 1,400 miles from the consumer would be as close as a ton of superphosphate located only 100 miles distant, although conversion into a usable agricultural phosphate at some near-by point is still involved.

### Potash Deposits of Wyoming

In Wyoming, likewise, are the Nation's richest deposits of potash silicates, containing 200,000,000 tons of K<sub>2</sub>O, which recent research indicates can be recovered concurrently with phosphorus to yield potassium phosphate of 86 per cent plant-food concentration. Closeby deposits of cheap coal promise low production costs and further offer the opportunity for ammonia synthesis.

Less remote are the potash deposits of Nebraska from which the Nation derived its chief supply of that agricultural necessity during the war years of potash famine. To what extent they can be brought back into production remains for research to determine. Undeveloped Texas deposits and deposits now under development in New Mexico

provide additional supplies.

The future fertilizer requirements of the Middle West, therefore, seem assured. High concentration will reduce distribution costs so that these products can be delivered at costs comparable with those now prevailing in more favored regions.

J. W. TURRENTINE, Bureau of Chemistry and Soils.

# FERTILIZER COMBINING SUPERPHOSPHATE WITH FREE AMMONIA SUCCEEDS

The first inixed fertilizers used in this country were prepared by mixing Peruvian guano or other nitrogenous material with superphosphate. To distinguish a mixture of this kind from a straight superphosphate it was commonly referred to as an ammoniated superphosphate. Within the last few years this same term has been applied to a mixture of a somewhat different character prepared by treating superphosphate with free ammonia.

The treatment of superphosphate with a basic material such as ground limestone, calcium cyanamide, etc., for the purpose of improving its mechanical condition, is a practice of long standing in the fertilizer industry. The possibility of using free ammonia in the treatment of superphosphate has also been recognized for some time, but its application for this purpose was not adopted until recently,

owing to the relatively high cost of the ammonia.

The use of superphosphate as an absorbent for free ammonia was first applied commercially in the recovery of ammonia from illuminating gas. The ammoniated product obtained in this way was recommended for use as a fertilizer directly or after treatment with sulphuric acid to render the reverted phosphoric acid again soluble. This process, however, as well as others that have been proposed for a similar purpose, has so far failed to come into general use owing to the action of the superphosphate in absorbing toxic constituents of the coal gas in addition to ammonia.

### Recently Developed Processes

In a series of processes described by more recent investigators the conditions of the ammoniation treatment are more or less reversed. In the original processes the superphosphate was necessarily shipped to the source of the ammonia and it served the double purpose of re-

covering ammonia and supplying phosphoric acid for fertilizer use. In the later processes the ammonia is shipped in solution or as anhydrous ammonia to the source of production of the superphosphate, where it in its turn serves the double purpose of supplying nitrogen and acting as a conditioner for the superphosphate. With the commercial development of the synthetic process, free ammonia has become the cheapest form of combined nitrogen and its direct addition to superphosphate or superphosphate mixtures constitutes the most economical way of incorporating nitrogen in a mixed fertilizer. The consumption of free ammonia in fertilizer mixtures increased from about 5,000 tons in 1928 to 40,000 tons in 1930, and is likely to increase still further in the future. Its utilization in this way is one of the most interesting and important of the recent developments in the fertilizer industry.

The ammoniation of superphosphate or superphosphate mixtures is a comparatively simple operation and consists in adding a measured quantity of anhydrous ammonia or a solution of ammonia to a weighed quantity of the material or mixture in rotating drums or standard fertilizer mixers. The treatment of the superphosphate or mixtures containing superphosphate is usually carried out in batches of one-half ton

to 1 ton each.

The rate of absorption of ammonia by a superphosphate containing the usual percentage of moisture is very rapid and is complete within one or two minutes, but the rate decreases with decrease in the water content of the superphosphate. The rate at which a superphosphate reacts with ammonia also decreases as its ammonia content approaches the maximum that it is capable of absorbing.

The ammonia is shipped in steel tank cars containing 50,000 pounds of liquid anhydrous ammonia. At the fertilizer plant the ammonia is either used directly as anhydrous ammonia, or it is absorbed in water to form a solution of ammonia of 25 to 30 per cent concentration.

The risk attending the storage of aqua ammonia is less than that of storing the anhydrous material. The use of the latter, however, has certain advantages over the use of aqua ammonia. It gives a drier product which shows less tendency to stick to the mixing apparatus and other equipment in which the treated material is handled around the plant. The quantity of ammonia in the form of a 25 to 30 per cent solution that can be added to the average superphosphate is limited to a maximum of about 2 to 25 per cent. Further additions give a mixture that is too wet and sticky. Anhydrous ammonia, however, produces dry mixtures of excellent mechanical condition up to the maximum that the superphosphate will absorb.

#### Limitation on Use of Free Ammonia

Both forms of ammonia, when added in excess of 2 per cent of the superphosphate present, bring about an apparent reduction in the availability of the phosphoric acid in the fertilizer as measured by the former official method for determining availability. The use of free ammonia was, therefore, limited to about one-fourth of the maximum that it is possible to include in a fertilizer mixture.

The apparent loss of availability that the superphosphate undergoes when ammoniated is due to a reaction between the ammonia and the components of the superphosphate to form a phosphate that is more or less insoluble as determined by the former methods of test-

ing. The authors of this article made a study of the composition and properties of the products formed in this reaction, and this study indicated that the availability of these products to plants should be greater than the official method then in use for measuring phosphoric acid availability would indicate. This was confirmed by the results of pot tests carried out by 20 State experiment stations with samples of the various forms of reverted phosphate occurring in ammoniated super-

phosphate.

The results obtained in this collaborative study showed that it should be possible at least to double the quantity of free ammonia used in fertilizer mixtures without appreciably decreasing the fertilizing value of the phosphoric acid in the mixture. Steps were accordingly taken by the official organization of the State control chemists which permitted an increase of about 100 per cent in the use of free ammonia in fertilizer mixtures. This will provide for an increase in the annual use of synthetic ammonia in this country of at least 80,000 tons having a wholesale value of about \$8,000,000.

### Aids Drillability of Fertilizer Mixture

When ammonia is added to a fertilizer mixture containing superphosphate a marked increase in temperature occurs almost instantly, owing to the heat developed in the reaction. The ammoniation of superphosphate is thus of further interest in fertilizer manufacture in that this heat may be utilized in driving off excess moisture or may be applied as an aid in the granulation of the product, whereby its drillability may be greatly improved.

The direct use of free ammonia thus offers the advantages that (1) it brings about a marked reduction in the cost of fertilizer nitrogen; (2) it greatly improves the mechanical condition of the mixture; (3) it prevents rotting of the bags by neutralizing free acid in the fertilizer; and (4) it affords a means for reducing freight and handling charges

by increasing the concentration of the fertilizer.

WM. H. Ross and K. D. Jacob,

Bureau of Chemistry and Soils.

# POTASH EXTRACTION FROM UNITED STATES DEPOSITS STUDIED IN PROMISING EXPERIMENTS

Nearly every mineral found on the earth's surface contains some potash. The average rock contains about 3 per cent. Rocks containing as high as 5 and 6 per cent are not uncommon, although materials containing more than 10 per cent potash are extremely rare. A chemical process can not turn out a product containing anything not contained in the raw materials used. The possibility of developing a potash industry in the United States is dependent upon whatever deposits of potash minerals can be found in this country. Two promising deposits known are the greensand deposits of New Jersey and the leucite deposits of Wyoming. The potash content of the New Jersey deposits runs 5, 6, and 7 per cent; these deposits are tremendous in size, occur near the surface, are cheaply mined, and are relatively near the fertilizer market. The Wyoming deposits are not so extensive, although they are enormous; they are not quite so easily mined, and are farther from the present fertilizer market, but contain 10 and 11 per

cent potash. In its experiments and attempts to develop a process for producing potash, the Bureau of Chemistry and Soils is concentrating its major effort on these two minerals as raw materials for the possible process.

Extracting Potash from Rocks

Rocks are rather difficult things for the chemical engineer to break up into their constituents. This does not mean that satisfactory chemical means are lacking, but merely that most of these means are too expensive, so that the cost of extracting the product is more than the product is worth. The bureau is attempting to subject these potash minerals to furnace treatment at high temperatures. Carload lots of the Wyoming rock and the New Jersey sand have been shipped to the bureau's laboratory and treated in a number of experimental furnaces. The minerals are heated to the melting temperature and as they melt the potash comes out of the furnace as a fume. This fume may be removed from the furnace gases by an electrical device known as the Cottrell precipitator. This process can be easily operated and by it more than 90 per cent of the potash in the rock should be readily recovered.

### Potash from Wyoming Rock

The characteristics of the Wyoming rock and particularly its relatively high potash content make it somewhat more easily adaptable to furnace treatment, so that the bureau's experiments indicate that a commercial furnace in Wyoming treating this rock may ultimately be able to produce a potash fertilizer material in competition with potash from other sources.

## Potash from New Jersey Greensand

The New Jersey greensand with its lower potash content and with the larger amount of impurities which the furnace must melt, and still more important the higher cost of fuel in New Jersey as compared with that in Wyoming, have made it more difficult for the bureau to develop a process that would produce New Jersey potash at a cost as low as the price of imported material. Developments in the greensand process are going forward very satisfactorily and it is not possible to predict whether the commercial utilization of the Wyoming potash deposits or of the New Jersey greensands will be the first undertaken by industry. The utilization of these and other of the country's natural resources should result in a potash industry comparable with the country's needs for fertilizers.

P. H. ROYSTER, Bureau of Chemistry and Soils.

# FERTILIZER PLACEMENT OF VAST IMPORTANCE IN COTTON-GROWING STATES

The difficulty sometimes experienced in securing a full stand of cotton, which is important in producing large acreage yields, may be caused by the use of poor seed, by environmental and climatic conditions, or frequently by the incorrect application of fertilizers. To obtain maximum results from commercial fertilizers in growing cotton, the method of applying the fertilizer, the time of application, and the placement of the fertilizer in relation to the position of the seed are important.

A common practice is to apply the fertilizer in an open furrow, mix and cover it with several inches of soil a week or 10 days prior to planting the seed. This procedure has possibly been considered the best practice for many years but it has now become desirable to apply the fertilizer and plant the seed in a single operation, thus saving labor and expense. In each procedure the fertilizers may be placed too near the seed or in contact with it, frequently resulting in injury to germination and broken stands. However, less injury to cottonseed probably has occurred when the fertilizer is applied before the seed is planted, because under favorable soil-moisture conditions the readily soluble fertilizer salts will be dissolved in the soil moisture, and distributed and absorbed over a wider soil area, resulting in less concentration of

fertilizers in the soil within the root zone of the young plants

The necessity for precaution is greater in applying the newer fertilizers containing larger quantities and higher concentrations of readily soluble salts than in applying fertilizers manufactured before the war and containing relatively small quantities of quickly soluble salts and large quantities of slowly soluble nitrogen materials of vegetable and animal origin. The results of four years of experiments with cotton in Virginia, North Carolina, South Carolina, and Georgia show that fertilizers containing readily soluble salts applied under the seed or in contact with the seed simultaneously with planting caused less injury on heavy clay soils than on light sandy soils, and when fertilizers were applied to the side of the seed or under the seed two weeks before planting there was no injury to germination or to young plants. The amount of water-soluble salts in the soil within the root zone of the young plants three weeks after fertilizer application was greater where fertilizers were applied under the seed or in contact with the seed than where they were applied to the side of the seed. The degree of seed injury from fertilizers may vary with moisture conditions in the soil. In these experiments, in seasons of heavy rainfall, there was a smaller concentration of soluble salts in the surface soil and less injury to seed and young plants.

In using commercial fertilizers in growing cotton, precautions should be taken to apply them so as to avoid injury to seed and to young plants, yet they should be placed sufficiently near the seed to become available during the early period of growth. A supply of readily available plant food is essential in forcing the growth of cotton in the

spring to achieve early blooming, fruiting, and maturing.

# Experiments in South Carolina

Extensive experiments in efficient fertilizer distribution and placement with cotton have been made by the Department of Agriculture, cooperating with the South Carolina Agricultural Experiment Station and a joint committee representing farm-machinery and fertilizer manufacturers. A number of fertilizer-distributing machines used for cotton work were found to have cycles of delivery and distributed the fertilizer very ununiformly, resulting in an ununiform stand and growth of cotton. The more irregular the distribution of fertilizer the lower the yields. Some machines apply the fertilizers ineffectively in some cases so near the seed as to cause injury to germination or too far away from the seed to be most effective. In other experiments fertilizers were applied in more than 20 different locations with respect to the cottonseed. The results vary with the character of the soil

and with moisture conditions. On a sandy clay loam soil the placement of fertilizer did not interfere with stands of cotton except where the fertilizer was in contact with the seed. On fine sandy loams and coarse sands fertilizers applied at a depth of 3 inches or less below the seed caused considerable injury to germination, being more severe at the shallower depths and extremely severe when the fertilizer was in contact with the seed. With fertilizer placed at the side of the seed there were normal germination and good stands.

The increase in rate of a concentrated fertilizer above 200 pounds per acre was attended by injury to the stand when the fertilizer was



Figure 205—Effect on stand of cotton of a fertilizer analyzing 8 per cent nitrogen 16 per cent phosphoric acid, and 8 per cent potasts, applied as follows A.—Miried with the soil below the seed, a, 600 pounds, b, 400 pounds, c, 200 pounds per acre B.—In bands 2 25 inches to each side of and 2 inches below level of seed a, 600 pounds b 400 pounds c 200 pounds per acre

applied below the seed, although no effect upon the stand was noticed where the fertilizer was applied to the side of the seed. In Figure 205 the stand of cotton resulting from applying a high-analysis fertilizer under the seed and to the side of the seed is shown. This cotton was planted April 22 and photographed May 17. The characteristics and distribution of mature plants resulting from the placement of the fertilizer are shown in Figure 206. In plots where the seed germination was retarded, early growth checked, or a broken stand prevailed small yields of cotton were produced.

If fertilizer is to be applied below the seed, as is the common practice, it may be found advantageous in using concentrated fertilizer or large amounts of ordinary analysis fertilizer, to apply a portion of the mixed fertilizer at planting time and the remainder as a side dress-



Figure 206 —Characteristics and distribution of mature cotton plants on a fine sandy loam fertilized with 800 pounds per acre of a fertilizer containing 4 per cent nitrogen, 8 per cent phosphone acid, and 4 per cent potash applied as follows A. in contact with seed, B, in bands 2.25 inches to each side of and 2 inches below the level of the seed

ing after chopping the cotton. The greatest efficiency may be obtained from fertilizers when they are placed closest to the seed provided injury to germination is not serious

J J. SKINNER, Bureau of Chemistry and Soils.

## FERTILIZER EXPERIMENTS SHOW PHOSPHATE IS CHIEF NEED IN THE MIDDLE WEST

There is an interesting fertilizer story about the Great Plains country and the intermountain region of the United States. It refers to the phosphate requirements of many of the soils in these regions for successfully growing sugar beets, grains, alfalfa, and other products. Use of fertilizers is comparatively new in these lands, but the tonnage consumed is increasing rapidly and a fruitful field is being opened up for the extension of the use of fertilizer, especially phosphates, at the present time. Back of this development lie years of research and trial, sometimes discouraging, but ultimately pointing clearly the way to increased yields per acre and a more profitable agriculture.

The need for a systematic study of the fertilizer requirements of these Middle West soils was brought to the attention of the Department of Agriculture early in 1921 by representatives of the beet-sugar industry, who emphasized in particular the necessity of such studies in the Arkansas River Valley of Colorado. A preliminary investigation showed that both yield and sugar content had shown a gradual decline since beet culture was begun in the valley; it was asserted that measures must be taken to make the growing of sugar beets more profitable to the growers and to the factories, since two factories were already idle; that fertilizer experiments in the past had shown no results; that nitrate was present at times and in certain places in prohibitive amounts. The officials and research staffs of some of the big companies operating in Colorado and now pushing a vigorous fertilizer program stated that fertilizers had been tried and found ineffective in these fertile western soils and that their influence on beet production was negligible.

There was then no fertilizer worthy the name sold in these regions. Growers were advised by some persons familiar with these conditions to let well enough alone, that the main difficulties were beyond the scope of soil-fertility investigations and remedial fertilizing measures. The department began some preliminary work in May, 1921, at Rocky

Ford, Colo.

### Triangle Experiments With Fertilizer

Since the nitrate content in these Arkansas Valley soils had been shown by the Colorado experiment station to be high, it was thought that a balance might be struck by applying the proper quantities of potash or phosphate, or both. With this view and to test the principle of balanced plant food, the now well-known triangle experiments were started. In these, all possible combinations of the three plant foods, nitrogen, phosphoric acid, and potash, were applied singly, in combinations of two, and in combinations of all three, in different proportions or ratios, to a total of 21 different combinations. By this means it is possible to determine readily a definite indication of which plant food is the most deficient in the soil, or the most effective in the fertilizer combinations, and to obtain some indications of the best and most profitable analysis. Several years' results are necessary, of course, to a final answer to the question, but even the first year's evidence was promising in showing that the fertilizers high in phosphoric acid seemed to be most effective. That year the flood which did such tremendous damage at Pueblo swept down the Arkansas Valley and overflowed the experimental plots to a depth of 5 or 6 feet, so mutilating them that it was necessary to abandon the project without obtaining any definite records of value.

The experimental work was resumed in 1922 at four different localities, at Rocky Ford, at Las Animas, at Wiley, and at Lamar. All these experiments indicated that fertilizers high in phosphoric acid gave good responses, although the lighter soils studied showed that a complete mixture was indicated for best results.

In the experiments at Lamar the yield from phosphoric acid alone was 15.2 tons of beets and 4,120 pounds of sugar per acre. Nitrogen alone produced 12 tons of beets and 2,897 pounds of sugar and where potash only was used, 10.6 tons of beets and 2,643 pounds of sugar per acre were obtained.

Where phosphoric acid, nitrogen, and potash were used in combination as a complete fertilizer, the yield of beets was no greater than with phosphoric acid alone, but 295 pounds more of sugar per acre were obtained. The average of the unfertilized plots was only 10.4 tons of beets and 2,738 pounds of sugar to the acre.

## Conclusive Results at Grand Island, Nebr.

The first experiment at Grand Island, Nebr., in 1925, was located in a field leased by a sugar company for experimental purposes as being representative of the average farming land of that section. The returns for phosphate fertilizers were perhaps as conclusive as any results yet obtained. The unfertilized plots yielded 4.9 tons of beets per acre and only 1,361 pounds of sugar. The phosphoric acid alone produced 15.2 tons of beets and 5,253 pounds of sugar. Phosphoric acid with a little potash or nitrogen added gave 16.8 tons of beets and an even higher proportion of sugar. Eighty pounds of phosphoric acid, or 500 pounds of 16 per cent superphosphate per acre, were used in these experiments. Later experiments showed that the same amount could have been distributed over 2 acres instead of 1 without any material diminution of yield, so that about 30 tons of beets might have been obtained from 2 acres with the same amount of fertilizer. (Fig. 207.)

The experiments continued in following years in Colorado, Nebraska, Iowa, Minnesota, and North Dakota, have shown conclusively that this response to fertilizers high in phosphoric acid, and to superphosphate alone, is fairly characteristic of the soil regions in which sugar

beets are grown.

The value of these experiments is accentuated by the low cost of the plant-food element most needed and the results to be obtained from an application of fertilizer as small as 125 to 200 pounds per acre of a 16 to 20 per cent superphosphate. Where the treble superphosphate is applied, not more than 100 pounds per acre is generally necessary. The cost of the fertilizer to the grower is from \$2 to \$3 per acre. With an average increase of 3 tons per acre at \$6 per ton the additional profit is about \$15 per acre—as much as the total value of a good wheat crop.

In 1922, when the soil-fertility work with sugar beets was started, no fertilizer was used commercially on sugar beets in Colorado, the largest and most profitable sugar-beet territory in the country. The beetsugar companies adopted a fertilizer program based upon the results of the experiments conducted by the department in the Arkansas Valley. They started with a carload but the practice more than doubled with each successive year's results and recommendations. One of the companies, observing in 1928 that the superphosphate-treated fields held the beet disease, known as blackheart, under control, has to-day an extensive phosphate program under way

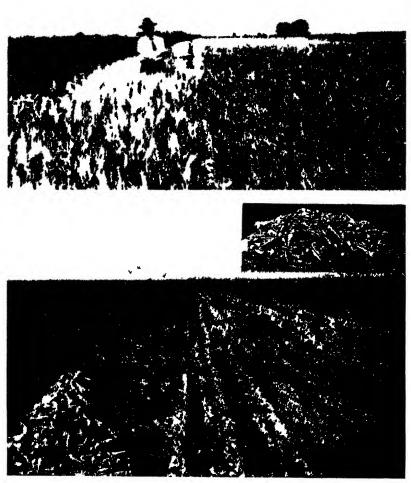


Figure 207.—Effect of superphosphate on grain and sugar bests on Middle West suls. On left, 150 pounds of superphosphate per acre, on right, no superphosphate

# Superphosphate Distributed By Sugar Companies

When the soil-fertility studies were begun in 1925 in Nebraska no commercial fertilizer was being used on sugar beets. So striking were the results of the experiments by the department that in 1927, five carloads of superphosphate were distributed by one of the beet-sugar companies in its Nebraska territory. Other sugar companies also distributed it to their growers to mutual profit.

tributed it to their growers to mutual profit.

Inspired by the good results obtained in Nebraska, requests came for the extension of the soil-fertility studies to include Iowa, Minnesota, and North Dakota, which was done in 1926, when two complete tri-

angle experiments were started in Iowa, three in Minnesota, and one

in North Dakota. (Fig. 208)

Growing sugar beets in the Red River Valley of North Dakota and Minnesota was a new project and doubt was expressed as to whether they would need fertilization in such supposedly rich soils. Continued experiments, however, showed most convincingly that proper fertilization of sugar beets, even upon the rich Red River Valley lands, will pay. On account of the results obtained through the department's cooperative work with the sugar companies, several carloads of fertilizer were distributed by the sugar companies in that territory. In the sugar-beet region of northern Iowa the use of fertilizer is now made a part of the contract between growers and the beet-sugar company.

### Steady Increase in Fertilizer Tonnage

From a single carload of fertilizer in Colorado in 1923, following the department's experimental demonstration of profitable results, the

tonnage of fertilizer used has grown steadily throughout the sugar-beet territory as the result of this work of the United States Department of Agriculture, of the State experiment stations, of beet-sugar companies, and of fertilizer companies, and to-day the fertilizer consumed in the sugar-beet territory has reached a considerable amount. In one district every acre in beets in 1931 was fer-

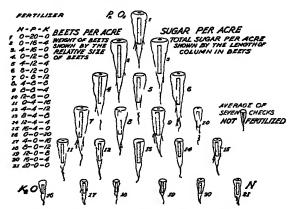


FIGURE 208—Relative yields of beets and sugar obtained with different fertilizer combinations in Middle Western States, showing the phosphate response in these soils.

tilized with phosphate. No definite information is available at this time on the acreage of sugar beets that is fertilized this season, but it is estimated at 200,000 to 300,000 acres. With an average increase of 3 tons of beets per acre, at \$6 per ton, the value of the 1931 crop was increased by about \$5,000,000, at a cost for fertilizer approximating \$700,000. The increased value in grain and other crops can not now be estimated, but the extended use of fertilizers for this purpose in Nebraska and adjoining States is very large.

OSWALD SCHREINER, Bureau of Chemistry and Soils.

# TOBACCO IN SOME SOILS MAY REQUIRE SECONDARY ELEMENTS IN FERTILIZER

A complete fertilizer has been considered to be one containing the three essential elements—nitrogen, phosphorus, and potassium. Owing, however, to the complex materials previously used in their manufacture, the so-called complete fertilizers have contained considerable quantities of essential elements other than the three mentioned above.

However, there is at the present time a tendency toward the use of relatively pure chemicals to supply the three constituents heretofore regarded as constituting a complete fertilizer.

## Elements Necessary for Growth

More than one-half of the tobacco crop of the United States is grown on sandy and sandy loam soils. These soils are relatively low in natural plant food and in this respect may approach the pure sand culture as used by the physiologist in his studies on the mineral nutrition of the plant. Recent investigations have shown that at least 10 elements need to be taken into account in any consideration of the mineral nutrition of the plant, namely, nitrogen, phosphorus, potassium, magnesium, calcium, sulphur, chlorine, iron, manganese, and boron. These elements are present in various quantities in tobacco soils, and their relative abundance determines what constitutes a complete fertilizer under a given set of conditions. Heretofore in general fertilizer practice only three of the above-mentioned elements—nitrogen, phosphorus, and potassium—which may be called the pri-



FIGURE 209 — A. Tobacco grown with a fertilizer mixture which did not supply calcium and magnesium; B, tobacco grown on a near-by plot which was fertilized with a mixture furnishing calcium and magnesium

mary elements, have been given any serious consideration. When pure chemicals which supply only these three elements were used on some of the sandy and sandy loam tobacco soils very unsatisfactory growth was obtained. However, when the secondary elements, magnesium, calcium, sulphur, and chlorine, were supplied, growth was normal.

#### Elements Deficient Under Field Conditions

Recent studies with the tobacco crop have indicated that magnesium and calcium are likely to be deficient when only nitrogen, phosphorus, potassium, sulphur, and chlorine are supplied. (Fig. 209.) The supply of sulphur sometimes appears to be insufficient during the early growth of the tobacco plant, this insufficiency slowing down the growth rate. However, as the season advances, either the soil supply gradually becomes available, or the rainfall seems to bring down sufficient sulphur, or the two factors combine to furnish enough of this element for the needs of the tobacco plant. Chlorine is another element that produces a decided effect on the growth of the tobacco plant. It is readily absorbed by the plant, and in conditions of comparative drought it may serve to prevent the so-called drought spot on

the leaves of the plant. This protective action from drought injury is not specific for chlorine, but also seems to be obtained from the element nitrogen when that is liberally supplied in the nitrate, ammonia, or organic form. This is particularly fortunate, because the use of chlorine may produce a leaf of low fire-holding capacity which is so undesirable in the cigar types, since these are grown with an abundant nitrogen supply. If large quantities of chlorine are absorbed by the plant when the soil moisture is adequate, the water content of the tissues may be raised to a point where the carbohydrate metabolism of the plant is so upset as to produce retarded growth. When chlorine

is used in excess the cured leaf is of poor quality.

A shortage of manganese and iron so far have not been reported as occurring under field conditions with tobacco. Soils of neutral or alkaline reaction have been found in some instances to supply an amount of these elements insufficient for normal growth of other crops, but, in view of the fact that tobacco does not succeed well under these conditions, owing to disease, these elements have not been found to be practically important as fertilizer ingredients for this crop. The necessity for boron under field conditions has not been observed in this country, but a shortage of this element has been reported as producing a typical malnutritional disease in Sumatra. From a practical standpoint none of the other elements, such as copper or zinc, which have been reported by some investigators as essential to normal growth, has been shown to be of any importance in tobacco fertilizer practice.

### Quantities of Secondary Elements Needed

The constitution of a complete fertilizer for tobacco depends somewhat upon the type of leaf to be grown. Special attention must always be given to effects on the quality of the cured leaf. The quantities, ratios, and sources of the three primary elements of commercial fertilizers have been fairly well worked out for the different types of leaf produced in this country, but it has only recently been recognized that fairly definite quantities of the secondary elements must also be

supplied on some of the light soils used in growing this crop.

Information available at present seems to indicate that magnesium and chlorine should be supplied at the rates of 20 to 25 pounds per acre in soluble compounds. The quantity of calcium and sulphur should be 50 pounds or more per acre. Magnesium, sulphur, and chlorine should not be supplied in amounts greatly in excess of the quantities indicated, because they are injurious when used in excess. For those types of tobacco to which abundant nitrogen is supplied in the fertilizer mixture, chlorine should be omitted. The above quantities of the three or four elements, as the case may be, can be obtained by using appropriate amounts of standard fertilizer materials. Superphosphate may be relied upon to furnish the necessary calcium and sulphur in addition to the phosphorus. The magnesia may be obtained from oil-cake residues, sulphate of potash-magnesia, or dolomitic limestone. The chlorine, if necessary, can be supplied in the form of muriate of potash.

### Tobacco Plant Shows Distinct Deficiency Symptoms

By observing the tobacco plant it is often possible to determine the element needed to constitute a complete fertilizer. It is characteristic

of this plant to develop distinctive pathological symptoms when any one of the essential plant nutrients is lacking in the soil, if the ferti-

lizer mixture does not supply the element in question.

A deficiency of nitrogen is shown by the whole plant assuming a light-green color, with more or less yellowing and drying up or "firing" of the lower leaves to a light-brown color. A shortage of phosphorus, on the contrary, produces a plant that is abnormally dark green in color. A shortage of potassium and magnesium, in contrast with nitrogen and phosphorus deficiency, results in localized effects, with chlorosis of the lower leaves as the dominant characteristic. Typical potassium hunger is distinguished from magnesium hunger by the appearance of small necrotic spots or specks at the tips and margins of the chlorotic leaves. The chlorotic areas in the case of potassium hunger are yellowish, while when magnesium is lacking they are light green or white, with the principal veins tending to retain the green color in both cases. Under potassium deficiency the leaves turn or roll under at the tips and margins and in the case of magnesium hunger appear to cup up.

In contrast with the deficiency effects of the above elements are those typically occurring on the new growth or bud leaves and caused by deficiency in iron, manganese, sulphur, boron, or calcium. Of this group only calcium deficiency has been observed on tobacco under field conditions in this country. A shortage of calcium first becomes apparent as a peculiar hooking downward of the tips of the young leaves composing the bud, followed by a breaking down of these leaves at the tips and margins. If later growth takes place, the tips and margins show a cut-out appearance. In extreme cases of calcium

shortage the terminal bud dies.

J. E. McMurtrey, Jr., Bureau of Plant Industry.



# FAMILY LIVING STANDARDS DEPEND ON USE AS WELL AS ON SIZE OF INCOME

"The farmer's standard of living," is frequently spoken of as if all of the 6,000,000 farm families in this country enjoy the same living conditions. Actually, of course, farm-family living ranges from the very meager subsistance which is typical of certain unfavored sections, to the abundant and varied living available to some families in very fertile areas. And in every part of the country there are many families whose living conditions for one reason or another leave much to be desired, even in years of general prosperity. Any methods of improving these conditions which are within the reach of the family are worth consideration.

The level of family living on the farm depends upon several different factors—the size of the family's cash income, the efficiency with which it is spent, the food and fuel furnished by the farm for family use, the kind of house which the farm affords, the furniture and equipment secured in past years, the hours of labor on the farm and in the home, and the skill with which the homemaker uses the various materials

available.

Cash expenditures are the usual measure of the standard of living of city families, who must purchase all of their food and fuel and, in most cases, pay rent. Most farm families, of course, raise a large part of their food supply, procure their fuel from the farm wood lot, and have the use of the house without money payment. Nevertheless the amount of money which a farm family has to spend is of very

great importance in determining what its living will be.

In the rugged valleys on the western slopes of the southern Appalachian Ranges live many American farm families whose environment is frequently as difficult as it is beautiful. The slopes of the valleys are very steep, the soil is shallow and the valley floors are narrow. In many of the communities in this area making even a meager living takes long hours of work, great patience, and skill in overcoming geographic difficulties. The average money expenditure of 227 families in Knott County, Ky., a district typical of many parts of the Appalachian Highlands, was \$450 in 1929. In spite of the fact that these families raised about two-thirds of their food supply, more than one-third of their cash expenditures went to buy food. Another third was spent for clothing, and the remaining small sum was used in buying the other things needed.

## Varying Division of Incomes

The money incomes of these mountain families are of course lower than those of most farm families in the United States in normal years. When the family's cash expenditures are as high as \$900, the division of the total is naturally quite different from that which is usual at the lower income levels. A study of 2,886 farm families in 11 States whose expenditures averaged \$913 showed that only 24 per cent of the total was spent, on the average, for food, and 26 per cent for clothing, while half was left for household-operating expenses, the maintenance of health, education, recreation, savings, and other items that go to make up what we think of as typical American family living.

The highest average money expenditures shown in any recent study of farm-family living were made by a group of 40 families in Maryland, Vermont, Illinois, and Ohio, whose household accounts were analyzed by the Bureau of Home Economics. These families spent on the average \$1,684, allotting only 19 per cent to food and 14 per cent to clothing, and having a full two-thirds of the total left for other items.

Whether the cash expenditures are large or small, it is clear that improving the use of the farm family's money income is one important means of improving family living. Even the wisest management will not, of course, convert an inadequate income into an adequate one. But by careful planning the homemaker can make the available income go as far as possible. She can see that all the needs of every member of the household are taken into consideration before the money is spent. And she can make sure that no important purchases are made until information has been secured on whether the goods about to be purchased are durable and well constructed and suited to the needs of the family.

Another means of stretching the family's cash income is by producing at home as much of the family's living as possible. In the Kentucky mountain group referred to above, a considerable proportion of the goods which the family consumed was produced at home. One-half of these families were doing their own shoe repairing, two-thirds were making quilts, three-fourths were making soap, and one-fifth were making brooms. A few were still using the spinning wheel, a few were weaving fine woolen blankets and coverlets, and a few were making furniture. Churning, canning, pickling, drying fruits and vegetables, and butchering were being carried on in every home. Many of these activities are not feasible, of course, in every farm household, but they are suggestive of the ways in which the cash income can be supplemented by the time and skill of the housewife and other members of the family.

# Food Furnished by the Farm

The food which the family raises for its own use is perhaps the most important addition which can be made to the family income. Most farm families, of course, produce some of their own food supply, but frequently not enough to provide a completely satisfactory diet all the year round. In the Kentucky mountain group, the average money value of the food raised at home, and of the game and wild berries and cresses with which the families supplemented their diet,

was \$430 a year, almost as much as the total amount of their money expenditures. For the 2,886 families with annual cash expenditures of \$913, the average value of food furnished by the farm was \$440, about the same as that for the lower-income group. For the group of 40 families with the highest money expenditure, the value of home-produced food was also highest, amounting to \$540 a year. It is of crucial importance that food production in the garden and other parts of the farm should be carefully planned in relation to the dietary needs of the family, so that an adequate food supply may be provided in the most economical way.

The differences in housing standards between one rural section and another are greater than the differences in the money value of food consumed. The average value of the houses studied in the Appalachian county mentioned above was \$340, while that of the homes occupied by 2,886 families in 11 States was almost \$2,000, and the account-keeping families cooperating with the Bureau of Home Economics

occupied homes valued at an average of almost \$5,000.

In considering the betterment of the family living, many farm home-makers will think first of the improvements they wish to make in the houses in which they live. While the changes they desire may be impossible in years when cash resources are especially low, some important alterations may be carried out by members of the family, using supplies from the farm itself. Provisions for adequate sanitation, for instance, cost very little money, but they are imperative to the health of the family.

When the money values of all the goods and services furnished to these families by their farms are added together, the averages are found to be \$546 for the Appalachian group, \$684 for the 2,886 families in 11 States, and \$876 for the 40 account-keeping families. These goods and services formed more than one-half the total value of family living for the first group; about two-fifths for the second group; and about one-

third for the third group.

It is convenient to measure the total value of family living of any group of families by adding the average value of goods and services furnished by the farm to the average cash expenditures. Measured in this way, the total value of living of the three groups considered here amounts to \$996 for the first; \$1,598 for the second; and \$2,560 for the third.

These figures can not, however, be compared directly with the money expenditures of city families. There are many elements in both the urban and rural situations which can not be measured in terms of their money value to the individual family. The feeling of security which comes to the family whose home and food supply are certain, even though its cash income is very low, is not the least important factor in the rural situation. Sunlight, fresh air, and quiet, which the farm family takes as a matter of course, have an important health value, even if it has never been stated in terms of dollars and cents.

The improvement of farm-family living is largely dependent, of course, upon increase in cash income, but it is also true that important changes can be made by planning family expenditures more carefully and by utilizing the resources of the farm with increasing skill for

bettering the conditions of family life.

FAITH M. WILLIAMS, Bureau of Home Economics.

# HOME ECONOMICS RESEARCH ASSISTS HOME MAKERS TO SPEND INCOME WISELY

The standard of living a family is able to maintain depends upon the money income of the family, its labor resources, and the ways in which both income and labor are used. Economical distribution of time and money makes possible a higher level of living when incomes are static. When the money income falls, the standard of living may be seriously threatened, if not drastically lowered. A shrinkage of the moderate income may mean only a lesser degree of comfort, but the shrinkage of low incomes may be a matter of health, morale, or even of life and death.

It is at such times, most of all, that the housewife needs knowledge of the foods the body requires and of the foods that furnish the best nutritive values for least money. She needs to know which foods, which household material or services can be substituted for each other,

and she needs to know which the family can safely do without.

The broad function of the Bureau of Home Economics, which is to assist in maintaining and improving the standards of home life, was never more effectively served than during these last years of drought and unemployment. From every section of the country, from farm and city alike, appeals have come for information and advice which would enable the home maker to safeguard the health of her family in the present times of stress. County agents, home-demonstration agents, relief workers, and social-welfare organizations of many kinds have asked and received assistance in programs of community service. A food guide, in terms of low-cost foods exclusively, was issued for housewives and for relief workers, and this has been supplemented by a weekly press release designed to help the housewife to adapt the food guide to market conditions and to plan meals and recipes for food available within the minimum budget.

These are current emergency aspects of the practical service of the Bureau of Home Economics in maintaining standards of living. An increasing volume of mail, bringing evidence of appreciation and requests for further service of this kind, shows the timeliness of this work. Meantime, however, there has been no cessation in the long-range work of the bureau, one division of which has in view the better

adjustment of large-scale production to consumer needs.

The direction of money expenditure, at all times vital in its effect on comfort and health, has come to be increasingly important since the home has ceased to be a self-sustaining unit and has become more and more dependent on goods produced outside. With the rapid development of modern industry, food, clothing, bedding, furnishings of all kinds—almost every article of household use and almost every kind of household service once produced in the home—are now produced commercially. The home, itself, so far as commodities are concerned, has become more important as a consumer than as a producer. The American home is in all probability the largest consumer's market in the world.

#### Difficulty of Judging Values

The consumer, however, is confronted with a staggering array of goods from which to choose and is too often left without means of judging their quality or adaptability to home needs. The home maker has to meet the requirements of her family with expenditures limited by the cash income and the usable labor resources of the home.

American farms and factories are equipped and organized for largescale production of goods which must be sold in quantity to justify production costs. Competition in sales has multiplied variety of products, has increased the selling costs, and has launched a system of high-powered salesmanship which results in still further confusion of values.

The effect of all this has been to change the emphasis in certain practical fields of education and in none more than in home economics. The greater the distance between the man who makes or grows goods for home use and those who use these goods, the greater the need for education of the consumer in wise choice of the purchased commodities and the more important a study of consumer needs as a guide to production markets.

Such studies are being made by the Bureau of Home Economics in several projects now under way. Data on home expenditures showing the distribution among food, clothing, housing, health, savings, luxuries, etc., are being collected to show consumption trends and standards of living. Budgets are being collected to show the lowest incomes that permit an adequate standard of living. The food supplies of different population groups in several sections of the country are being studied and checked against the nutritive needs of those groups.

Standards for expenditures based upon real needs, and expressed in terms of materials to be bought, would not only be a guide to wise consumption, but should form the foundation upon which to build a stable production program. Volume production requires a stable market to keep it going smoothly. Any interruption of production brings unemployment, decreased incomes, lessened buying power, and decreased demand. There must be a better fit between consumer demand and goods produced, to provide stable income to purchase those goods. A production program guided by home needs, with the fewest steps between producer and consumer, will safeguard standards of living.

Such a production program must be established on the basis of ascertained facts, and it is to supply such facts in terms of consumer needs as well as trends of actual consumption, that the Bureau of Home Economics investigations in this field are made. Because the same set of facts can be used to guide the producer in estimating consumer demands, these studies should have double importance in promoting better standards of living.

Louise Stanley, Bureau of Home Economics.

# DIVIDING THE FOOD DOLLAR INTO FIVE PARTS HELPS TO SAFEGUARD LOW-COST DIET

For any family, careful planning is necessary to provide the best diet obtainable at every season of the year. This truth applies both to the city family which must purchase all of its food and to the rural family which produces part of its food and purchases the rest. It applies more emphatically to the family of small means anywhere, because the need of well-balanced meals becomes greater as the available food supply grows less.

The quantities of the different articles of food which are needed will differ from family to family, but the kinds of food required are the

same. All of the nutritional needs of a family of five, with two adults and three children, will be met by the foods listed below. This list of foods is adjusted to families whose income is small and who can produce but little food at home.

SUGGESTED WEEKLY FOOD SUPPLY FOR FAMILY OF FIVE (TWO ADULTS AND THREE CHILDREN) WITH LOW INCOME

Flour and cereals (1 pound flour counts as 1½ pounds bread.).	20 to 24 pounds.
Milk	18 to 28 quarts.
Potatoes or sweetpotatoes	12 to 15 pounds.
Dried beans, peas, or nuts	1 to 3 pounds.
Tomatoes or citrus fruits	
Leafy or other green or yellow vegetables	4 to 5 pounds.
Other vegetables and fruits	10 to 13 pounds.
Butter	1 pound.
Other fats (including salt pork and bacon)	2 to 3 pounds.
Sugar, molasses, jellies	
Lean meat, poultry, fish	5 to 7 pounds.
	8 to 12.
EggsCoffee, tea, cocoa, salt, baking powder, etc., as needed.	•

This food supply will furnish the food elements known to be necessary for health, normal growth, and development. The amounts of some of the foods, however, are not as generous as might be desired, and whenever possible, the larger quantities of milk, eggs, vegetables, and fruit should be used. These foods contain important substances not found in sufficient amounts in the other articles of the diet. The larger quantities of all other items will be needed if the adults are engaged in hard work, and if the children are very active and are growing rapidly.

## The Food Dollar of the City Family

The cost of this food supply will vary, at present retail prices, from about \$7.50 to \$10 a week. The exact cost will depend upon what varieties of food are chosen within each food group and the quality and form in which they are obtained, as well as upon the dealer and the services, such as delivery or credit, which may or may not be provided by the store at which the goods are bought.

When all the family's food is purchased, and at retail prices, expenditures for the various kinds of food will be balanced if the food dollar is spent approximately as shown in Figure 210. For a family with chil-

dren this would mean:

25 cents for milk and cheese. 20 cents for vegetables and fruit.

20 cents for fats and sugars.

20 cents for breadstuffs, cereals, and legumes.

15 cents for other foods—eggs, lean meats, fish, and accessories, as salt, tea, coffee, and baking powder.

# Food Expenditures of Farm Families

In most localities the farm family does not purchase all of its food, but produces much of it. Many farm families produce all the milk, butter, eggs, poultry, and vegetables, most of the fruit, and a large part of the lard and lean meat which they need.

These home-grown products may amount to from one-half to four-fifths of the money value of the entire food supply. In a recent bureau study of 2,400 farm families, food purchases were found to be restricted mainly to manufactured foods, such as flour, prepared cereals, sugars, cheese, and such accessories as coffee, tea, salt, or spices. The cash

outlay for food was relatively small, and was apportioned very differently from that of the city family. Each food dollar of these farm families was spent approximately as follows:

	Cerre
Vegetables and fruit	. 15
Fats and sweets	25
Bread, cereal, flour	35
Lean meats or fish	10
Accessories	

To be sure, foods produced at home cost time and energy, and may add somewhat to farm expenses. But this extra effort or expense is abundantly repaid by the improvement in the family's diet which it

makes possible. By planning carefully for raising and preserving food at home, farm families with low cash incomes can enjoy throughout the year the kind of food which only families of moderate or large income can afford when all of the food must be



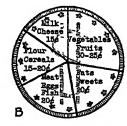


FIGURE 210.—Divide your food dollar into five parts: A, For a family with children, B, for a family without children

bought. Their diet can be better than the low-cost diet suggested above, since they can include a larger proportion of milk, butter, vegetables and fruits, eggs, and lean meat and poultry.

#### Better Diet Possible at Less Cost on Farms

The following weekly food supply shows the amounts of the different foods needed to provide this better diet for a family of five, with two adults and three children. Such a diet is within the reach of farm families who produce a large share of their food at home and of city families with moderate incomes.

# SUGGESTED WEEKLY FOOD SUPPLY FOR FAMILY OF FIVE (TWO ADULTS AND THREE CHILDREN) OF COMFORTABLE MEANS

Flour and cereals (1 pound flour counts as 1½ pounds bread) Milk			15 pounds. 28 quarts.
Potatoes or sweetpotatoes			10 pounds.
Dried beans, peas, and nuts		to	1 pound.
Tomatoes or citrus fruits		to	8 pounds.
Leafy or other green or yellow vegetables	6	to	8 pounds.
Other vegetables and fruits	15	to	25 pounds.
Butter			2 pounds.
Other fats (including salt pork and bacon)			
Sugar, molasses, jellies			7 pounds.
Lean meat, poultry, and fish			15 pounds.
Eggs Coffee, tea, cocoa, salt, baking powder, etc., as needed.	11/2	to	2 dozen.
Coffee, tea, cocoa, salt, baking powder, etc., as needed.			

This generous food supply provides fully for the nutritional needs of the family and allows considerable variety. It will yield menus much more interesting and appetizing than those of the low-cost dietary, and, what is more important, the body will receive larger quantities of the food elements which contribute to a high degree of health and vigor.

At present retail prices this list of foods may cost the city family from \$15 to \$18 a week. But the farmer with even a low cash income can

furnish his family with this excellent diet if he raises the right kinds of food in the right amounts, and if the housewife preserves the surplus for winter use. On most farms the acres devoted to home food production and the hours devoted to food conservation bring very gratifying returns.

HAZEL K. STIEBELING, Bureau of Home Economics.

# MEAT DEMONSTRATIONS INCREASE INTEREST IN SUP-PLYING HOME NEEDS

The problem of getting food from producer to consumer economically becomes greatly simplified when the producer is also the consumer. Specialization in certain branches of agriculture, such as cotton growing, has tended to change many farmers from producers to purchasers of their own home meat supplies. Yet, in recent years, meat demonstrations sponsored by extension and other specialists have done



Figure 211—Hogs slaughtered and dressed on a farm in Lamb County, Tell, as a result of a meat demonstration in that com-munity in the winter of 1930-31

much to acquaint farm families with the practical possibilities of providing a considerable proportion of their home meat

supplies.

A typical example is a program of meat demonstrations begun in Texas in the fall of 1930. The activity was inaugurated by the Texas Agricultural Extension Service in cooperation with the

Federal Bureau of Animal Industry, working in cooperation with county agents and home demonstration agents of the various localities. The extension specialists staged demonstrations in killing hogs, cattle, and lambs, and preparing meat products from these animals.

# Demonstrations of Killing, Cutting, and Curing Methods

Demonstrations in killing hogs, cutting the carcasses, and curing and otherwise preparing the meat were conducted in 13 counties. These meetings were attended largely by the county and home demonstration agents of the counties involved and others near by, together with many rural leaders who desired to qualify themselves for conducting or assisting in similar demonstrations in their own localities. Each demonstration usually lasted a day and a half.

On the afternoon of the first day instruction was given in proper killing methods, from one to three hogs being killed for this purpose. On the second day the carcasses were cut up, the meat was put down in the cure, lard was rendered, and all by-products, such as sausage, scrapple, headcheese, liver paste, and mincemeat, were prepared by the women present, under the direction of a home-industries specialist.

Such a pork program has become very popular in many counties of the State. Twenty-five county agents conducted pork demonstrations in their own counties after attending and assisting in a district demonstration supervised by the meat specialist.

As a result of the pork program carried on in 12 counties around Lubbock, Tex., a ham and bacon show was sponsored by the South Plains Fair Association and the Lubbock Chamber of Commerce. There were 712 entries of cured and canned meat products, including 112 hams, 71 pieces of bacon, 47 shoulders, 11 samples of sausage, 91 containers of lard, and canned products such as roasts, chops, sausage, and scrapple. In connection with this meat show, a 4-H club fat-calf and pig show was held. The animals were sold at auction at the close of the show, most of them being purchased locally. This combined show was of outstanding value in increasing interest in farm butchering and meat curing. It was also a means of demonstrating what high-quality cured meats really were, as well as how they could be produced. Special killing, cutting, and curing demonstrations were held during the show.

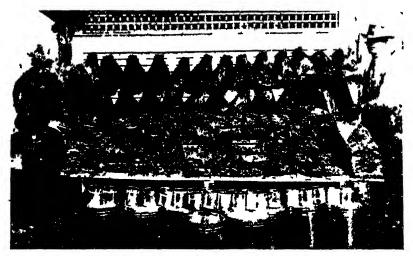


FIGURE 212.—Meat products prepared from 15 hogs on a ranch in Texas Many ranchmen are keenly interested in the home preparation of their meat supply

# Beef and Lamb Programs Also Carried On

As much interest has been shown in the beef and lamb programs as in the pork programs, primarily because of the high production of cattle and sheep in the State. The beef and lamb demonstrations have been conducted in almost the same manner as have the pork demonstrations. A variety of beef products—some to be used fresh, some canned, some cured, and some dried—has been advocated. Lamb demonstrations have become especially popular, primarily because of thegeneral lack of knowledge about handling lamb. Learning how to kill the animal and how to remove the pelt is stimulating lamb consumption, particularly in the important sheep-producing areas of the State.

The interest in the meat work, including beef, lamb, and pork, was evident from the number of people attending the meetings, as many as 125 people assembling to witness the demonstrations in most counties. As a result of these activities Texas farmers and ranch owners are increasing the production of their home meat supply. (Figs. 211, 212, and 213.) Agricultural agents report that many farm-

ers who previously kept no hogs on their farms now fatten from one to five or even more for home use. For many families home-canned beef was made available for the first time during the summer of 1931.

#### Meat Demonstrations Held in Cities

Interest in the meat program has not been confined to the farmers and ranchmen of the State. Meat demonstrations have been conducted also in towns and cities. Some were held to acquaint retailers with new cutting methods, others to furnish city housewives with



FIGURE 213 — Nearly wrapped and labeled meat prepared for sale by a group of furmers in the south plains of western Texas

information on selecting and buying both lamb and beef. A survey taken in four large towns in Texas during the spring of 1931 revealed that the consumption of lamb had increased as much as one-third after special lamb demonstrations had been given there.

Though the interest in meat demonstrations in cities is noteworthy,

the principal aim of the program in Texas has been to encourage a better-balanced meat supply for farm and ranch homes. In many instances pork had been utilized almost exclusively, and oftentimes the supply lasted only a few months. To encourage a more varied and adequate diet throughout the year, the present recommendations include beef and lamb as well as pork, and also other meats such as chicken and fish. The needs of a family of five adults appear to be well supplied by approximately two hogs weighing about 225 pounds each, one beef animal weighing about 550 pounds, and two lambs weighing approximately 85 pounds each.

ROY W. SNYDER, Bureau of Animal Industry.

# COTTON IS UTILIZED AS NEW FOUNDATION MATERIAL FOR MAKING HOOKED RUGS

The program of the division of textiles and clothing of the Bureau of Home Economics includes projects that stress effective ways of using cotton and wool fabrics. In many cases the studies utilize materials already available and suggests ways of using them in the home to produce the best results. Whenever fabrics satisfactory for a particular purpose are not on the market, new ones are developed if a definite use for them is seen. An example of this is the recent development of an inexpensive cotton material for the foundation of hooked rugs.

Requests for such material were received from several Southern States where making rugs of this kind has become an established home industry. Until recently burlap has been used almost univer sally for such foundations but it has not been wholly satisfactory and there was a need for a more suitable fabric. The requests were prompted also

by a desire to find another use for a home-grown fiber. As a result, the Bureau of Agricultural Economics and the Bureau of Home Economics, working cooperatively, set up specifications for experimental fabrics, had them woven and then subjected them to scientific and practical tests.

Modifications were made in the original specifications until a satisfactory fabric was obtained. (Fig. 214.) It is 40 inches wide, the

same yarn is used for both the warp and the filling, and has the same number of threads per inch fillingwise as warpwise It has been sized lightly and then calendared to hold the fuzzy ends close to the varn and to make the material easier to use. The new fabric possesses all the desirable characteristics of the best quality burlap and in addition is as strong in the warp as in the filling yarns.

# Comparisons With Other Materials

In Table 13 the cotton material is compared with the various kinds of burlap ordinarily used. The cotton is almost identical in construction with the art burlap which is the grade found in many high-quality commercial rug patterns. The thread count, weight per square yard, and thickness are practi-

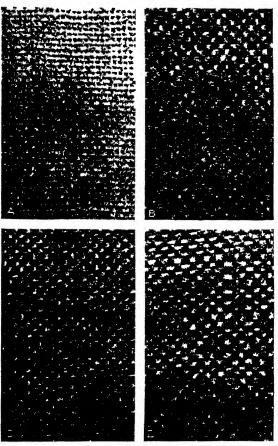


FIGURE 214—A, Cotton material recently developed for use as foundation material for hooked rugs, B, art buriap, C, upi-olsterers' burlap; D, burlap bagging

cally the same, but the tensile strength of the two materials differs conserably. The cotton warp shows a strength of 126.4 pounds as compared with 85.6 pounds in the burlap; but the filling yarns of the burlap are stronger than those in the cotton. These figures indicate that the burlap is unevenly balanced and it seems logical to assume that the warp yarns would break sooner than the filling. This is always a serious defect in any fabric. Also the jute fiber in the burlap is known to deteriorate rapidly when exposed to moisture or sunlight, and under ordinary conditions of wear to become brittle and lose much of its strength, whereas cotton fabrics offer greater resistance to moisture and sun.

Fabric	Weave	Thread count per inch		Weight	Tensile: per 11		Thick-
		Warp	Filling	yard yard	Warp	Filling	11688
Gatten metadel	Plain		Number	Ounces 13. 1	Pounds 137	Pounds 133	Inch 0,035
Cotton materialArt burlap	do	14 12	14 12	11.5	85.6	176. 2	. 026
Upholsterers' burlap Burlap bagging	do	12 13 12	13 12	8. 4 8. 4	105 69 0	97.5 56.8	.031

Table 13.—Comparison of a new cotton material with the various kinds of burlap ordinarily used for hooked-rug foundations

Besides satisfying physical requirements, the new material meets certain practical demands made of any foundation fabric. It takes a design readily, remains taut in the frame during the hooking process and carries any type of filler that the rug maker wishes to use. The weave permits the yarns to slip apart easily to admit the needle and springs back to hold the loops in place. In order to judge the possibilities of the cotton material and the ease with which it could be handled, complete rugs were made using various kinds of fillers.

Bess M. Viemont, Bureau of Home Economics.

# FOOD-QUALITY STUDIES ELICIT FACTS THAT SERVE AS GUIDE TO PRODUCERS

"Standards for consumers" and "consumers' information" are becoming familiar terms, and with good reason. It is desirable for the consumer to know what contributes to quality or what constitutes a standard for every product he is selecting. But standards can not be set up arbitrarily. The characteristics of any product, manufactured or grown, are determined largely by production conditions as well as by variety. For this reason, the best way to aid in the present effort to increase consumers' information is to help the producer find out how to develop quality characteristics in his product. This is the aim of several studies set up in the food utilization section of the Bureau of Home Economics. Many times an investigation of this kind must begin with an analysis of differences in certain properties that contribute to quality. This is a step toward finding out the reason for variations, which step in turn leads to recommendations for modifying certain characteristics. In the case of natural food products such as rice and potatoes the findings of such studies are of greatest concern to the producer because he must apply them for the benefit of the consumer.

# Rice Varieties Differ in Cooking Qualities

Because of differences noted in the cooking qualities of rice, a study has been made of eight native-grown rices. These eight varieties comprise the major part of domestic rice now on the market for cooking purposes.

A preliminary study bore out the general observation that rices when cooked by the same method differ greatly in wholeness and stickiness of the grain. Tests then made showed that different rices required dif-

<sup>1</sup> Strip samples 1 inch in width used for tensale strength tests.

ferent lengths of time for satisfactory cooking. This fact is of significance to the producer because it warns him not to mix varieties in marketing rice. The native rices studied were ranked by the use of a score card, in the order of their desirability for boiling. Some varieties are much better than others for boiled rice, in which the aim is whole, distinct grains. The fact that both the method and the variety of rice influence the cooked product is of interest to home makers. The best variety of rice may be ruined by being boiled too rapidly or for too long a time, while rice with poor cooking qualities may be so handled in cooking as to give a fairly desirable result.

Samples of each lot of rice are being held in storage, and will be studied each year to determine the effect of aging on both quality and

cooking behavior.

At the present time the rice used in commercially canned soup is Patna rice, which is imported duty free from India. To be desirable for use in canned soup a rice must give a clear liquid, a firm, whole kernel, and leave little deposit in the bottom of the can. A comparison of eight native-grown rices with the imported Patna for use in canned soups showed that Rexoro, an American-grown Patna, was the only one that approached the Patna in desirability for this purpose. (Fig. 215.)



FIGURE 215.—Rice varieties used in canned soups. Patna at extreme left; Revoro next. Note clearness of these as compared with other samples

The other native rices rank in about the same order for soup as they ranked for boiled rice. The fact that the Rexoro does not serve quite as well as the Patna would seem to indicate, that variety alone does not cause the difference. The cause may be cultural methods, it may be aging, it may be milling. Further study to clear up this point is under way.

Potato Production and Storage Methods Affect Cookery

A study on potatoes has been set up, cooperatively among the Bureaus of Home Economics, Plant Industry, and Chemistry and Soils, to determine the relation of such factors as fertilizer ratios, breeding, and storage upon the cooking qualities of potatoes. The results of cooking tests show that the temperature of storage has a marked effect on the quality of potatoes for deep-fat frying and other methods of cooking. A low storage temperature increases the amount of sugar in the potatoes so that when they are fried they become too brown, even when cooked under proper conditions. This is very undesirable in the manufacture of potato chips for market, as well as in preparing them for the home. If potatoes are stored at approximately 60° F. they develop the best frying qualities.

Soils and fertilizers, climatic conditions, and breeding, as well as storage conditions, all play an important part in the development of desirable cooking qualities in potatoes. The determination of these

facts is an important step toward the development of superior products. Such information is already being used in producing potatoes with special characteristics. The interesting results of studies of this type on potatoes should be the stimulus for similar projects to find out what makes for high quality in other vegetables.

### Meat Tested for Palatability

Another study which has been under way for several years was set up to determine factors which influence the palatability of meat. This investigation is a cooperative project among the Bureaus of Home Economics, Animal Industry, and Agricultural Economics; 26 State agricultural experiment stations; and several other livestock and meat agencies. Animals are being produced under experimental conditions for the purpose of tracing the influence of such factors as breeding, sex, age, and feed on the meat when it is served. The food utilization section cooperates with the States in developing methods of cooking meat, cooks samples from experimental animals in preparation for palatability tests, and assists with the judging. As a part of this study 2,500 legs of lamb, 1,000 rib cuts of beef, and 600 pork roasts have been cooked and tested for palatability. The findings of this study are pointing the way to methods of obtaining high-quality meat as judged by palatability tests on the cooked product.

Thus the stepping-stone to better consumer information is through detailed investigations which are of primary concern to the producer. Many facts determined along the way can be immediately applied by the home maker. Practical information from the three projects just described has come out in the form of popular leaflets, as well as in

radio talks, press releases, and magazine articles.

FLORANCE B. KING, Bureau of Home Economics.

### LEISURE OF HOME MAKERS STUDIED FOR LIGHT ON STANDARDS OF LIVING

A family's standard of living is usually judged by the size of its income and the ways in which it spends its money. But the amount of leisure time which the members of the family enjoy and the ways in

which they use this leisure are almost equally revealing.

It is the use of the home maker's time which tells most about the family's standard of living. For home makers differ more in regard to leisure than do the members of any other group in the population. They are more often sorely overworked, and more often unduly underworked, than are the men of the family or the other women. At one extreme is the wage-earning mother who combines a job outside of the home with caring for her family. And at the other end of the scale is the true "lady of leisure," who has nothing to do but give directions to a staff of paid workers. The great majority of home makers, of course, fall well within these two extremes. For them the day's work consists in doing their own housekeeping in their own homes. How much leisure time do these women have, and how do they use it?

Some light is thrown on this question by a study made by the Bureau of Home Economics of the use of time of 1,041 home makers living in different parts of the country. More than half of these women, 642, lived on farms, and 287 others were rural women living in the open country or in villages of less than 2,500 population. The remaining

112 home makers lived in towns of less than 50,000 population. None of these women had full-time jobs outside of the home, and only a small proportion had any paid household help. Each home maker kept a detailed record of how she spent her time through the seven days of a week which was typical of her household life.

Table 14.—Average daily distribution of time among various activities by 642 farm home makers, 287 other rural home makers, and 112 urban home makers in towns of from 2,500 to 50,000 population

	Average time spent daily by—					
Kind of activity	Farm home makers		Other rural home makers		Urban home makers	
Work: Home making Farm work Other work	<i>Н</i> . 7 1	m. 23 19 05	H. 7	m. 20 27 14	H. 7	m. 18 04 09
Total	8	47	8	01	7	81
Personal needs: Sleep and rost. Eating meals Dressing and other personal care.	1	47 19 50	8	59 16 55	8 1 1	53 17 01
Total	10	36	11	10	11	11
Leisure: Informal social life. Reading. Meetings, study, church, community work. Other leisure activities. Transportation to and from home.		01 58 38 53 26	1 1 1	11 02 41 07 29	1 1	09 11 49 25 29
Total	3	56	4	30	5	03
Actively not clearly reported		21		19		15
Entire day	24		24		24	

What do these records show as to the time these home makers spent in leisure activities? The answer depends, of course, on what is meant by leisure. If we consider it simply as the time not spent in work and in sleeping, eating, dressing, and other personal care, we find that the farm home makers had 3 hours 56 minutes a day of leisure, on the average, or 27 hours 32 minutes a week. For the other rural home makers, the average was 4 hours 30 minutes daily, and for the home makers living in towns, 5 hours 3 minutes.

Table 14 shows how this leisure time was distributed by each of these groups of home makers, and how the rest of the 24 hours of the day was used. The average size of family of the farm group was 4.4 persons, of

the other rural group 4.1 persons, and of the urban group 4.

# Similarity Among Groups

The most striking point shown by the table is the similarity between these groups of home makers. The time spent in housekeeping and care of the family is almost identical, averaging 7 hours 23 minutes daily for the farm women, 3 minutes less for the other rural women and 5 minutes less for the urban group. The chief difference appears in the time spent in farm work—that is, in the care of poultry and milk, in vegetable gardening, and in similar tasks. With the farm women these tasks required an average of 1 hour 19 minutes daily, while only 27 minutes was spent by the other rural women, and almost no time,

of course, by those living in towns. In each of the groups, a few min-

utes a day was given, on the average, to other kinds of work.

Because of their additional farm tasks, the farm home makers' working day was considerably longer than that of the town home makers, averaging 8% hours as compared with 7% hours. For the other rural

home makers the average fell at just 8 hours.

This extra time which the farm home makers spent in work accounts, of course, for their smaller amount of leisure. They show, to be sure, a few minutes less each day for sleep and rest and for other personal care, but the time given to personal needs differed surprisingly little for the three groups of women. All of them met the standard of 8 hours of sleep, with nearly an hour's leeway of additional rest. And all of them spent a little more than 2 hours a day in eating meals, dressing, and similar personal care. The time which remained out of the 24 hours of the day was what was left for leisure.

Is 4 to 5 hours a day a reasonable amount of leisure? Or to put the question in more familiar terms, is 7½ to 8¾ hours a day a reasonable

amount of work?

At first glance the working days of these home makers seem to conform fairly closely to modern standards. But it must be remembered that the 8-hour day of industry applies to only a 6 or even a 5 day week, while the daily averages for these women cover the full 7 days of the week, Sunday included. In order to compare these figures with the working hours of other types of workers, we must consider the working week as a whole. For the farm group this amounted to 61½ hours on the average, and for the urban group to 52½ hours, with the other rural group intermediate.

# Majority of Farm Women Overworked

Even these town housewives, therefore, have on the average a heavier working week than most industrial workers at the present time. And the majority of the farm women are appreciably overworked; almost three-fourths of them worked more than 56 hours a week, and one-fifth worked over 70 hours. These working hours, moreover, must be maintained with little leeway throughout the 52 weeks of the year. Unlike most occupations, home making does not usually include vacations or slack seasons, or even holidays. And the leisure which it does allow seldom leaves the home maker free from her job for more than a few hours at a time.

Turning to the ways in which these housewives used their leisure, the averages for the three groups are again surprisingly similar. About a fourth of the time was spent in reading, and another fourth in talking (visiting), playing cards, and similar informal recreation with other people. Around three-quarters of an hour a day, on the average, or five hours a week, went to attending meetings and classes, studying, going to church, and doing various kinds of church and community work. Going back and forth in connection with their leisure activities occupied approximately half an hour daily; and the remaining small amount of time had to suffice for all other kinds of recreation—attending movies, concerts, and entertainments, going to teas, dances, and similar social affairs, taking drives, listening to the radio, writing to friends, and myriad other interests. Clearly no one can claim that the home makers included in this study are frivoling away their time.

HILDEGARDE KNEELAND, Bureau of Home Economics.

# FOOD-COMPOSITION DATA AID RESEARCH WORKERS TO INTERPRET FOOD STANDARDS

The home maker's problem of planning meals is not only a matter of providing what the family likes and can afford, but of providing at the same time foods that will furnish nutrients needed in a balanced diet. Not many home makers, however, have the time or inclination to study the abstract principles of nutrition. Most of them want to be certain that they get enough of the right kinds of foods, without being bothered with counting calories or estimating the protein and iron content of their diet. It remains for nutrition specialists, therefore, to figure out the food requirements for persons of different ages and to supply home makers with the necessary information in such convenient and familiar terms as bread, meat, fruits, vegetables, and milk, which go to make up the daily menu.

To do this it is necessary to know the composition of foods. Some are good sources of protein, some contain fats and carbohydrates, and others are valuable for their mineral content and their vitamins. Some contain much water, some are concentrated. Some contain indigestible material which does not count as food. In order to make possible the translation of body needs into terms of actual foods, the Bureau of Home Economics maintains a service which collects and analyzes all available information on composition of foods. This material is put out in the form of circulars made available to nutrition workers and teachers, in order that they may have accurate data as a

basis for instruction on food selection.

The demand for information of this kind is increasing, judging by the inquiries the Bureau of Home Economics receives. Requests are frequent for data on the composition and fuel value of fresh fruits and vegetables not included in the usual tables in textbooks. Publications already issued contain data on the composition of these groups of food in so far as the protein, carbohydrate, fat, water, and total ash are concerned. These tables have been prepared after analyses from hundreds of soures have been collected, evaluated, reviewed, and summarized.

#### Work on Minerals Less Advanced

The work on minerals has not progressed so far, but the collection of calcium, phosphorus, and iron determinations in foods has already proved helpful to nutrition workers who are seeking data on the mineral content of certain food materials. One of the most urgent needs is information about the iron content of foods, because of the importance of iron in preventing and correcting certain types of anemia. After reviewing the available literature for data on iron in food materials, a list of foods that are especially rich in iron has been prepared and a chart is being issued for use in classrooms, lectures, and exhibits.

The results of these studies are made available to the general public through popular bulletins or news releases on foods or food selection. Publications of this type usually include some discussion of the nutritive value of particular foods or their place in the diet. Such discussion is based upon knowledge of food composition derived from chemical and biological studies. When the reader of a department news story or a bulletin on food for children is told that liver is a very nutritious food, or that leafy vegetables should be included in the diet frequently, he probably does not realize how much experimental work must be done in order to make such a simple dietary recommendation.

CHARLOTTE CHATFIELD, Bureau of Home Economics.

## VITAMIN CONTENT OF MANY FOODS MEASURED BY TESTS WITH RATS

Foods may be grouped according to their importance as sources of energy, protein, or minerals. By selecting from these different groups it is possible to assure a reasonably balanced diet. There is another important factor to consider, however, that is, the vitamin content. What foods contain the different vitamins? And how much loss of vitamin content occurs in the preparation of those foods for use? To answer these questions, both for housewife and for dietitian, the nutrition laboratory of the Bureau of Home Economics is carrying on extensive investigations.

Earlier laboratory studies show that animals can not live on a diet of chemically pure foods. These studies led to the discovery of vitamins, substances present in small amounts in most of the natural foods. It is now known that there are at least six of these vitamins and that five are essential to the health of human beings. They seem to act as regulators of certain body processes and if any one of them is missing from

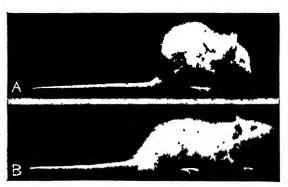


FIGURE 216.—A, Young rat as he appeared after two months on a diet lacking vitamin A; B, his brother, after receiving the same diet for six weeks, was then given butter as a source of vitamin A for two weeks. Photographs taken at the same time.

the diet a characteristic diseased condition develops. Pellagra, for example, is the result of such a dietary deficiency. This disease may be corrected, as well as prevented, by including in the diet certain foods known to contain the pellagra-preventive factor.

When a rat is deprived of vitamin A it soonstopsgrowing and after several weeks, during which time it

has become listless, thin, and anemic, the appearance of eye lesions is noted. These become progressively worse as time goes on. Sooner or later the animal dies, and autopsy reveals the presence of infection not apparent from observation of the live animal. Pus sacs are found in the glands of the tongue, mouth, and neck, as well as in the ears. If vitamin A is added to the diet of such an animal before the disease has progressed too far, i. e., before the tissues have been permanently injured, recovery is rapid and apparently complete. (Fig. 216.)

As soon as the importance of vitamins was discovered, chemists and nutritionists began to search out the foods containing them in most considerable quantities. Not until recently, however, have any of these factors been isolated in pure form so that they could be identified chemically. This meant that the usual chemical methods could not be used in measuring them and other methods had to be devised for this purpose.

Measuring Vitamin Values

It had been found that when an animal like the rat is kept on a diet that is deficient in one vitamin there is a quantitative relation between the amount of that factor present and the rate of decline of the animal. Or conversely, if the animal has been kept on a deficient diet until the

characteristic diseased condition has developed, and then is fed a food rich in the missing vitamin, the rate of recovery depends upon the amount of the vitamin in the added food. (Fig. 217.) By describing as a unit the amount of a vitamin that will produce a given effect in a "standardized" rat, it is possible to determine the relative vitamin values of any food

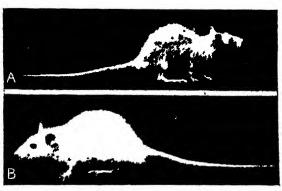


FIGURE 217.—A. Photograph of a young rat kept for 24 weeks on a diet lacking vitamin G; B, same rat six weeks later during which time it was given a diet rich in vitamin G

that the rat will eat. We have such values for vitamin A and vitamin C, and a few for vitamin B. Some of those for the more common foods are given in Table 15.

Table 15.—Values of vitamins A and C in some common foods

	("nits p	er ounce	1	Units pe	
Edible portion	Edible portion  Vitamin C  Edible portion		Edible portion	Vitamin A	Vitamin
Apples Bananas Beans, string Cabbage Carrois Eggplant Eggs Escarole Grapes Lemons Lettuce	15 100 150 10 940 20 550 6, 900 (1)	3 5 5 20 2 2 2 2 3 3 2 15 2	Liver Milk (whole) Oranges Peas, raw Peas, canned Potatoes Sweet potatoes Spinach Tomatoes Turnips	2, 800 65 20 175 175 10 85 1, 400 170 5	1 15 15 10 3 3 25 15

<sup>1</sup> Practically none.

As yet we can not say what are the body requirements for the different vitamins. One authority on nutrition says that an adult needs at least 4,500 units of vitamin A per 3,000 calories, while another designates 45 units of vitamin C as optimum. By reference to Table 15 it is easy to see how to calculate what foods to eat to supply the needed vitamin A (escarole, liver, spinach, carrots, and eggs head the list), or what may be used in place of orange juice to supply vitamin C (spinach, cabbage, tomatoes, lemons, fresh peas).

Information of this kind, as rapidly as it can be determined and brought together from all the laboratories now engaged in such researches, is being published in department circulars, news articles, and

radio talks.

HAZEL E. MUNSELL, Bureau of Home Economics.

# STANDARDS FOR CHILDREN'S CLOTHES STRESS COM-FORT, SIMPLICITY, AND SELF-HELP

Expenditures for food can be definitely checked against standards set up in terms of the demands of good nutrition. There is no such check or guide for clothing expenditures. Unquestionably clothing choices have been largely determined by such human qualities as vanity, personal taste, and prejudice rather than comfort and health or even artistic design. It is believed that if a more definite relationship between clothing and health could be shown, some progress could be made in the establishment of fundamental clothing standards. The need for such standards is found in the size and fluctuation in the yearly clothing bill and in the seasonal nature of the industry.

In beginning such studies the Bureau of Home Economics disclaims any attempts to influence standards for adult clothing. It seemed possible, however, to make a start by a study of children's clothing, especially from the point of view of comfort, ease of care, and simplicity of design, applying the principles of modern psychology along with the

working out of certain physical and physiological factors.

No satisfactory methods for furnishing definite data on the influence of clothing on health have been developed. Animals can not be used in these studies as they can in the study of nutrition. While it is known that the amount and kind of clothing influence heat regulation and probably the resistance to infection, definite facts are difficult to obtain. The collection of information on kinds and amounts of clothing recommended by physicians and nurses in close contact with children showed great diversity of recommendation. A study of the weight of clothing worn by children compared with similar data collected 10 years earlier gave definite evidence that the weight of clothes worn had decreased, probably in part as a result of better heating in homes and in part as a result of a different point of view on the amount of clothing required.

The development of nursery schools where groups of young children are brought together under similar conditions and under trained supervision, offered an opportunity for studies of the problem. Beginning with the evident requirements of comfort and lack of restriction, designs for children's clothing were worked out, and garments were made and tested by observation under normal, active conditions of wear.

The care of small children who require frequent change of garments, brought from the nursery-school attendants the suggestion that designs be developed that make it possible for the children to enter into this necessary activity at an earlier age. Interested as nursery-school workers are in the mental development of children as well as in their physical care, they saw in dressing and undressing an opportunity for coordination of mental and physical development which might well be utilized in child training. Based on these suggestions, a number of designs have been prepared and tested, from which definite recommendations have been made for sun suits, little girls' dresses, little boys' clothes, rompers, and outdoor play suits. These, at least, are a beginning toward setting standards which embody comfort, lack of constriction, and ease of care, for children's clothes.

These are to be followed as soon as more definite methods can be worked out, by studies to show the influence of certain physical characteristics of clothing on physiological reactions of the child.

LOUISE STANLEY, Bureau of Home Economics.

### LAUNDRY TESTS UNDER SCIENTIFIC CONTROL SHOW HOW TO PREVENT DAMAGE

The average household has a considerable investment in its bed linen, table linen, and other fabrics that must be laundered. Therefore anything that can reduce or offset the wear and tear of the laundering process is an important home economy. The Bureau of Home Economics is conducting a series of tests and studies with different sheetings which have been manufactured from known grades of raw cotton under supervision of the Bureau of Agricultural Economics.

An obvious aim in such a project would be the prevention of scorch. It is easy to recognize damage by scorch when the iron has been hot enough to cause a stain. There may have been just enough heat, however, to cause a tendering of the fabric which is quite invisible. If this



FIGURE 218 —Household proner with which fabrics can be proped at a known temperature and pressure

occurs often, the fabric soon wears out. The experimental work thus far has developed a method of measuring the degree of scorch, as follows:

Before any fabric is ironed, the manufacturer's sizing or dressing is removed by the use of enzymes and a light washing process. Breaking-strength tests show that this treatment does not materially alter the mechanical properties of the cloth. All samples to be ironed are conditioned in a controlled humidity room, in which a relative humidity of 65 per cent is maintained. The moisture content of representative samples can then be carefully determined.

While the fabrics are being passed through the experimental ironer shown in the illustration (fig. 218), the temperature of the heated metallic shoe is obtained by an electrical device, in which the thermocouple replaces the ordinary mercury thermometer. The cloth being ironed is in contact with the heated metal under known pressure for about two and one-half seconds. The factors of time and pressure are

not varying here as in hand ironing, where they depend upon the operator. Uniform pressure conditions in the ironer can be maintained, however, only by careful attention to the contact between the metal shoe and the revolving roll. The latter takes the place of the board in

hand ironing, and must be kept uniformly well padded.

The material used at present on the experimental ironer consists of two layers of regular knit cotton padding, two layers of napped, double-faced cotton felt, and a muslin cover. In actual service, only muslin which has been preshrunk can be used satisfactorily on account of the moisture absorption from the fabrics being ironed. The preshrunk knit cotton padding offered to the laundry trade would doubtless give an additional advantage.

## Scorched Covers Should Be Changed

The covers need to be changed as soon as they develop even a slight indication of scorch. Fabrics ironed on scorched covers are liable to





FIGURE 219 —Cotton sheeting material treated with methylene blue solution, magnified 50 times A, Scorched material, B, unscorched material

acquire yellow stains in the presence of moisture and the oxidized or burned cotton material. This is obvious in the yellow coloration taken on by hot water in which a moderately scorched cover has been allowed to stand for a short time. Any padding used with such covering should be well aired, as it has usually acquired anodorwhich is soon communicated to a fresh cover and to the materials that are being ironed. The padding of the ironer should be unrolled and

fluffed up frequently to avoid any hard packing often occurring after continued service. While the roll should be uniformly firm, it should yield somewhat to the different materials that are being laundered.

In this connection it should be noted that no one fabric will be absolutely uniform throughout in thickness or surface. This becomes more evident from the manner in which scorch effects have appeared on the fabric shown in the magnified illustration. (Fig. 219.) It will be apparent that in the case of a light scorch the fibers on the surface act as a protection to the yarns underneath. When they constitute the only scorched part of the fabric, the breaking strength of the cloth is not noticeably changed. This is particularly evident in heavy, thick sheetings ironed under low pressure at a comparatively high temperature.

The yarns illustrated in Figure 220 were taken from other parts of the fabrics shown in Figure 219. In order to make the scorched condition more visible, the fabrics were treated with a solution of methylene blue dye. The comparative resistance of the unscorched fabric to

this treatment may be seen in Figure 219, B. This fact is made use of, but with a different procedure, in a quantitative method of estimating

chemical damage in the ironed cloth.

The weakening of the fibers taken from a scorched yarn is well illustrated in Figure 221. Both the unscorched fiber and the scorched were treated with the same chemical solution (Fleming and Thaysen solution) The comparative degradation of the scorched fiber is plainly evident

In this study of ironed fabrics various methods are being used for detecting chemical change. The viscosity determination is one of the

most satisfactory of these methods. In this test the ironed sample isground and dissolved in a cuprammonium solution. The time rate of flow of this cotton solution in an accurately measured, fine tube is then obtained. The more tendered the cloth sample, the more rapid will be the flow of the solution through the tube.

# Color Measurements of Surface Changes

When the mechanical and the chemical damage appear very slight, color measurements are employed to detect certain surface changes. scorched condition is indicated by the smaller amount of violet lightreflected from the sample. By a modified spectrophotometric method, determinations of the light reflected from the cloth

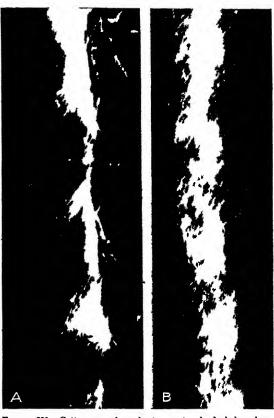


FIGURE 220 —Cotton yarns from sheeting material which have been treated with methylene blue solution A, Scorched yarn, B, unscorched yarn

are made for definite regions in the red, in the yellow, in the green, in the blue, and in the violet. While a deep scorch will obviously lessen the total amount of light reflected from a fabric, a faint scorch in a sample will be evident mainly from the smaller amount of blue-violet light reflected.

Observations made on the ironer when it is set for a pressure of from 1 to 1½ pounds to the square inch, show changes in certain 4-ounce sheetings for temperatures as low as 473° F. The surface of the roll just before it touches the hot metal is then at a temperature of from 99° to 104° (slightly warm to the hand). If the roll is allowed to turn against the heated surface so that its surface temperature is slightly

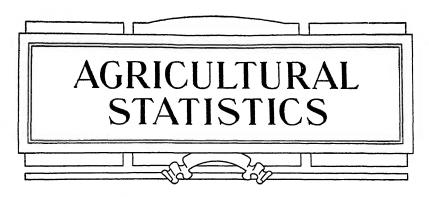
more than doubled, these same sheetings may be affected at a temperature about 45° lower. The first measurement described with the cooler roll is doubtless more comparable with hand ironing. It is of interest to note here that under service conditions for a period of time,



FIGURE 221 —Cotton fibers treated with Fleming and Thaysen's solution, magnified 640 times
A, Scorched fiber, B, unscorched fiber

the washing procedure appears to influence the scorching temperature of a fabric. Further investigation in this field should yield considerable information of practical value.

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Prepared under the direction of the Statistical Committee Joseph A. Becker, chairman, Lewis B Flohr, secretary, S. W. Mendum, L M Davis, E. J. Working, and B C Boree.

In the interests of economy, many tables formerly regularly included in this section of the Yearbook are omitted this year and the number of years has been Recent data for the omitted tables are for the most reduced for many series part available in current publications and can be supplied upon direct request For data for earlier years not covered in this Yearbook, the user is referred to past issues

The statistical section of this Yearbook brings together what seem from expemence to be the most important agricultural statistics for the United States, and for the world so far as the agriculture of this country is concerned

ical and geographical series have been given

For greater detail on individual commodities than can be shown in the Year-

For greater detail on individual commodities than can be shown in the Yearbook, the Statistical Bulletin series of the department may be consulted. For current statistics to supplement Yearbook statistics, the following sources should be used: (1) Crops and Markets—a monthly publication of the department carrying the latest current statistics on agriculture in the United States; (2) Foreign Crops and Markets—issued weekly by the Bureau of Agricultural Economics and devoted to current world statistics of crops, livestock, and markets—(2) foreign commodity, new s—published by the Bureau of Agricultural kets; (3) foreign commodity news—published by the Bureau of Agricultural Economics and showing the latest world information on single commodities and released as important information is received; (4) market news reports of the Bureau of Agricultural Economics—issued daily, weekly, monthly, quarterly, or at irregular intervals, at Washington and at the principal markets

The crop and livestock reporting service estimates acreage, condition of crop, yield per acre, production, and farm prices of crops, and numbers, production, farm prices, and values of livestock and livestock products. The organization of this work outside of the crop-reporting board and the office force in Washington consists of 41 State field offices, each with an agricultural statistician in charge There is one field office for the New England States, one for Maryland and Dela-

ware, and one for Utah and Nevada

Acreages for the year 1909 are as reported by the Bureau of the Census, acreages in 1919, 1924, and 1929 are based upon the census supplemented by State enumerations In the intercensal years, from 1910 to 1915, estimated acreages were obtained by applying estimated percentages of decrease or increase to the published acreage in the preceding year. The estimates from 1916 to 1918, 1920 published acreage in the preceding year The estimates from 1916 to 1918, 1920 to 1923, 1925 to 1928, 1930, and 1931 are based upon acreage changes from year to year as shown by a sample of over 2 per cent of the crop acreages in each year, supplemented by State enumerations Yields per acre are estimates besed upon acreages are estimated by State enumerations. mates based upon reports of one or more farmers in each agricultural township on the average yield per acre in their localities. For 1929, 1930, and 1931 these reports have been adjusted to be comparable with yields derived from the 1929 census. For certain crops, yields from 1919 to 1928 have been adjusted to be comparable with the census yields of 1919, 1924, and 1929. For these same crops, revisions of acreage have been made for the period 1919 to 1928 essentially to the acreages reported by the censuses of 1919 and 1929. Production is acreage times yield per acre

Estimates of farm stocks, sales, quality, crop condition, and miscellaneous information concerning crops are based either upon sample data or upon estimates

of crop reporters for their localities.

The term "commercial" is used in connection with certain crop estimates to distinguish some part of the total production of a crop. Except for indicating that the entire production is not represented in the estimate, "commercial" does not have the same meaning in each instance where used. The commercial apple estimate, for example, represents that portion of the total apple crop which is sold or available for sale for consumption as fresh fruit. That portion of the crop which is used for cider, vinegar, canning, evaporating, or other manufacture is not included in the commercial estimate as defined in this case. The commercial orange and grapefruit crops in Florida represent the portion shipped or to be shipped as differentiated from the portion canned, juiced, sold, or consumed locally, wasted, etc. Until recently, cherry estimates represented the commercial sales in certain States and included only the quantities shipped to market or utilized by canners, cold packers, and other processors. now include the total production in these commercially important States. mates of commercial truck-crop production are concerned only with those areas growing the crops primarily to supply the large consuming markets more or less distant from the producing center. Production in home and market gardens, intended principally for local sale, is excluded. Similarly with truck crops grown for commercial canning or manufacture the estimates include only amounts grown for use by canning or packing establishments and exclude amounts canned in the home. The truck and canning crop estimates are designed to include the total quantity produced on the commercial acreage in the areas concerned, whether or not the entire crop finds a market or a use.

Monthly estimated prices received by producers on the specified dates are based upon reports from special price reporters, who are mostly country dealers, on the average price paid to farmers and do not relate to any specified grade.

Farm values of crops as shown are mostly computed by applying the December 1 farm price to the total production. These prices are reported by the crop reporters, who are mostly farmers. The average price received for the portion of the crop sold may be greater or less than this price, depending upon the prices previous and subsequent to December 1, and the amount of the crop sold at the different prices. For commercial truck and canning crops, and for certain fruit crops, the prices shown are the estimated seasonal averages of the prices received by growers at the shipping point, the cost of the container included if

a customary requirement of delivery.

Numbers of livestock on farms on January 1, 1920, and 1925, are based upon the census enumeration as of that date, supplemented by enumerations by State agencies, such as assessors and brand inspection boards, and by records of shipments during 1920 and 1925. Numbers on January 1, 1930, give weight in so far as feasible to the numbers reported by the census of 1930 which was as of April 1, with allowance for indicated changes between January 1 and April 1. In the intercensal years, from 1911 to 1916, the numbers of livestock were obtained by methods identical with those used for crop acreages. Estimates from 1917 to 1919, from 1921 to 1924, from 1926 to 1930, for 1931 and 1932 are based upon a sample of over 2 per cent, supplemented by trends derived from assessors' enumberations, reports of brand inspection boards, market movements, and stockyard receipts. The census bases are not always comparable from one decade to another, because of changes of dates and classifications.

The average value per head on January 1 is estimated from reports of correspondents relating to livestock in their vicinity. These tend to reflect inventory values as distinguished from the monthly prices which relate to sales. The farm value on January 1 is computed by applying the average value per head to the

number on farms.

The Federal market news service supplies much of the information on market prices and movements. The leased-wire system in use by the service extends from the Atlantic to the Pacific and reaches most of the important markets of the country. At each of the branch offices commodity specialists gather information regarding the supply, the demand, and prices for the products on which they They observe the sales actually made on the markets and are constantly in touch with the traders, who in many instances give them access to their office records in order that they may have specific information on which to base their reports. Car-lot shipments and market receipts of crops and livestock products are reported by officials and agents of railroads, express companies, and boat lines, or compiled from trade publications. At markets where shipments by automobile truck have become of increasing importance, receipts by truck are reported by dealers and distributors. Data on receipts, slaughter, and shipments of livestock are obtained from monthly reports submitted by the public stockyards. Data on cold-storage stocks are obtained directly from all important cold-storage warehouses, and data on commercial stocks of grain are reported by boards of trade, etc. Leaf-tobacco stocks are reported directly by dealers and manufacturers.

Where a weighting factor is available market prices as shown are weighted averages; but in many cases a weighting factor is not available, and the prices shown are usually the means of ranges of quotations without reference to quantity. The weighted market prices of grain are based on the number of carload sales reported. The weighted average price of hogs at Chicago is based on total

sales of butcher and packer hogs to slaughterers.

Prices derived from different sources may not be strictly comparable, although for most general purposes they are satisfactory. The data as to commercial stocks and movements of various commodities are as nearly complete as practicable and feasible, and are considered fairly representative.

The statistics of grain grading are based on work done by licensed grain inspectors located throughout the United States.

Statistics of acreage and production in foreign countries are compiled as far as possible from official sources and are therefore subject to whatever errors may result from shortcomings in the reporting and statistical services of the various Inaccuracies also result from differences in nomenclature and classification in foreign countries. Except where otherwise stated, pre-war data refer Yields per acre are calculated from acreage and producto pre-war boundaries. tion, both rounded to thousand units, and are therefore subject to a greater possibility of error when calculated for countries with small acreage.

The tables of international trade cover substantially the international trade of the world. The total imports and the total exports in any one year can not be expected to balance, although disagreements tend to be compensated over a series of years. Among the sources of disagreement are: The different periods covered by the "year" of various countries; imports received in the year subsequent to the year of export; lack of uniformity in classification of goods as among countries; different trade practices and varying degrees of failure in recording countries of origin and ultimate destinations; different practices in recording reexported goods; and different methods of treating free ports. The exports given are domestic exports and the imports given are imports for consumption whenever it is possible to distinguish such imports from general imports, that is, "special" or net instead of general. General imports are all imports reported. In foreign countries "special" trade is imports for consumption, or net imports, or imports less reexports. In the United States imports for consumption are those entered for actual consumption and include withdrawals from warehouse for consumption. Special or net figures are used in the international trade tables for the following countries: Belgium, Denmark, Egypt, Irish Free State, China, Dutch East Indies, France, and United Kingdom. In the United States trade tables and wherever United States figures are given, they are domestic exports and general imports unless otherwise specified. While there are some inevitable omissions, there may be some duplication because of reshipments which do not appear as such in the official reports. In the trade tables, figures for the United States include Alaska, Porto Rico, and Hawaii, but not the Philippine Islands.

As an aid to the comprehension and use of these statistics, the following table of weights, measures, and conversion factors will be useful:

Weights, measures, and conversion factors used in the Department of Agriculture

Commodity	Tnit 1	Weight in pounds	Commodity	Unit 1	Weight in pounds
Alfalfa seed Apricots Barley Beans, dry Beans, dry Buckwheat Clover seed Corn, shelled Corn, ear, husked Cotton, ginned Cottonseed oil Granberries Flaxseed Grapefruit Hempseed Lemons Milk Oats Oranges (California) Oranges (Florida) Orchard grass		50 56 570 70 2 478 3 500 7, 5 100 56 2 70 44 2 74 8, 6 32 2 70 480	Peanut oil. Potatoes	Busheldo	60 50 45 60 56 196 7, 5 40 45 56 60 196
Commodity			Equivalents		•
Almonds Apples Barley flour Buckwheat flour Filberts Malt Oatmeal Do Peanuts Peaches (California) Prunes Rye flour Raisins Wheat flour Walnuts (English)	I pound d I barrel (I I barrel (I I pound s I barrel (I I pound s I barrel (I I pound s I pound s I pound d I pound d I pound d I pound d I pound s I pound s	ried is equipe pounds to be pounds to be pounds to be pounds to be pounds is equipe the list equipe to be pounds to be pou	quivalent to about 3½ pounds univalent to about 5 pounds of free) is equivalent to about 9 bushe is equivalent to about 7 bushe quivalent to about 2.22 pounds 1 is is equivalent to about 10 bushe is equivalent to about 10% bushel of oats. quivalent to about 1½ pounds univalent to about 1½ pounds free invalent to about 5½ pounds free invalent to about 5½ pounds free in to about 4 pounds free it oabout 4 pounds free it oabout 4 pounds free it oabout 4 pounds of grapes.  3) is equivalent to about 4.7 bust quivalent to about 2.38 pounds to quivalent to about 2.38 pounds of grapes.	sh, is of barley. is of buckwh inshelled, iel of barley. shels of oats. nshelled, ish, ish, ish,	

Standard bushel used in the United States contains 2,150.42 cubic inches; the gallon, 231 cubic inches? Net.
 Gross.
 Due to changes in milling processes, equivalents have varied as follows: 1790-1879, 5; 1880-1903, 4.75; 1900-1917, 4.7; 1918-1919, 4.5; 1920, 4.6; 1921-1931, 4.7.

# STATISTICS OF GRAINS

TABLE 1 .- Wheat, all: Acreage, production, value, exports, etc., United States, 1849, 1859, 1866–1931

							No. 2	Foreign	trade, ir	cluding f	dour,
				Price per	Farm	Spring wheat, price	red winter wheat,	yes	r beginn	ing July	
<b>37</b>	Acre-	Aver- age yield	Produc-	bushel re- ceived	value, basis Dec. 1	per bushel at Chi-	price per bushel			Net exp	orts 6
Year	har- vested	per	tion	by pro- ducers Dec. 1	farm price	cago, year begin- ning July <sup>1</sup>	at Chi- cago, year begin- ning July 2	Domes- tic ex- ports 4	Im- ports s	Total	Per- cent- age of pro- duc- tion
	1,000 acres	Bush.	1,000 bushels	Cts.	1,000 dolls.	Cts.	Cts.	1,000 bushels	1,000 bushels	1,000 bushels	Per cent
1849			100, 486 173, 105			66 90	82	7,536 17,213	2, 913 7 4, 493	5,701 712,720	7.8
1866	15, 424	9. 9	152,000	152.7	232, 110	219	94	12, 647	3, 093	10,828	7.1
1867	18, 322	11.6	212, 441	145.2	308, 387	198	145	26, 823 29, 717	2,014	24,550	11.6
1869	18, 460	12. 1	224, 087	108. 5	243, 033	134	123	29,717	1, 830	28, 314	12.6
1869	19, 181	13. 6	287,746 260,147	76. 5	199, 025	98	84	53, 901	1, 286	53, 126	20.4
1870	18, 993 19, 944	12.4 11.6	235, 885 230, 722	94.4	222, 767 264, 078	116 124	84 109	52, 574 38, 996	867 2, 411	52,195 37,587	22. 1 16. 3
1872	20, 858	12.0	249, 997	111.4	278, 522	121	111	52,015	1,841	50,705	20.3
1873	22, 172	12.7	281, 255	106.9	300, 670	116	103	91,510	2, 117	90,418	20. 8 32. 1
1874 1875	24, 967 26, 382	12.3	308, 103	86. 8 89. 5	265, 881 261, 397	95 106	98 86	72, 918 74, 751	368 1,664	72,845 74,508	23. 6 25. 5
1876	27, 627	10.5	292, 186 289, 856	97. 0	280, 743	122	92	57,044	366	57.148	19.8
1877	26, 278	13.9	364, 194	105.7	385, 089	111	121	92,142	1,391	92,028	25, 3
1878 1879	32, 109 35, 430	13. 1 18. 0	420, 122 459, 483	77.6	325, 814	90	95	150, 503	2,074	150, 253	35.8
1879	35, 430	14.1	499, 893	110.6	552, 884	110	99	181, 807	487	181,951	36.4
1880	37, 987	13. 1	498, 550	95.1	474, 202	100	105	181, 807 188, 308	212	188, 250	37.8
1881 1882	87, 709	10.2	883, 280	119.2 88.4	456, 880 445, 602	128 105	115 118	123, 371 150, 113	867 1,088	123, 211 150, 000	32.1 29.8
1883	37, 067 36, 456	13.6 11.6	504, 185 421, 086	91.1	383, 649	93	102	113, 822	33	113,892	27.0
1884	39, 476	13.0	512, 765	64.5	330, 862	1 79	83 88	135, 232	213	135, 301	26.4
1885	84, 189	10.4	357, 112	77.1	275, 820	81	88	96, 611	389 283	96, 569	27.0
1886 1887	36, 806 37, 642	12.4 12.1	457, 218 456, 329	68.7 68.1	314, 226 310, 613	77	76 75	156, 685 122, 616	596	156, 760 122, 524	34.3 26.8
1888	87, 336	11.1	415, 868	92.6	385, 248	95	88	90, 944	136	91,030	21.9
1889	33, 580	13.9	168.371					l			
1889	33, 580 34, 048	12.9 11.1	434, 383 378, 097	69. 5 83. 3	301, 869 315, 112	81 97	86 89	112, 488 109, 017	163 586	112, 507 109, 054	25. 9 28. 8
1891	37, 826	11.5	584, 504	83.4	487, 463	89	96	229, 465	2, 463	228, 841	39. 2 37. 1
1892	39, 552	13. 3	527, 987	62.2	328, 331	78	78	196, 068	968	195, 672	37.1
1893 1894	37, 934	11.3	427, 558	53.5	228, 599	60 57	68 57	168, 498 148, 630	1, 183	167, 531 147, 740	39. 2 28. 6
1994	39, 425	1 13. 1	516, 485	48. 9	252, 709	1 0/	1 0/	1 120,000	1 1, 200	1 121, 120	1 40.0

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board; italic figures are census returns.

7 Imports of flour estimated.

figures are census returns.

1 Spring wheat prices compiled as follows: 1849–1870, from Chicago newspapers, quoted; 1849, spring wheat, contract grade; 1859, standard spring, contract grade; 1866–1870, No. 1 spring, contract grade; 1811–1884, annual reports of Chicago Board of Trade, quoted as No. 2 spring, contract grade; 1885–1896, Bartel's Red Book, quoted as No. 2 spring; January, 1897–June, 1904, Chicago Daliy Trade Bulletin, average of daily ranges; quotations used; January—October, 1897, No. 3 spring; November, 1897–June, 1898, No. 3 spring, hard varieties; July, 1898–June, 1904, No. 1 spring; from February, 1897, "free on board" was used when available; July, 1904—December, 1918, Bartel's Red Book, average of daily ranges, quoted as No. 1 northern. Subsequently from the Chicago Dally Trade Bulletin and are averages of the daily cash price per bushel weighted by car-lot sales.

2 Prices, 1839–1898, are from the Price Current Grain Reporter 1924 Yearbook, p. 4, and are average cash prices for calendar years; subsequently from the Chicago Dally Trade Bulletin and are averages of the daily cash price per bushel weighted by car-lot sales.

2 Compiled from Commerce and Navigation of the United States, 1949, 1859, 1866–1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, 1919–1925, January and June issues, 1927–1931. Wheat flour converted to terms of grain on the following basis: 1849, 1859, 1866–1879, 1 barrel is the product of 5 bushels of grain; 1880–1908, 4.75; 1909–1917, 4.7; 1918–19, 4.5; 1920, 4.6; 1921–1931, 4.7.

1 Includes wheat imported for miling in bond and export.

3 Total exports (domestic) plus foreign) minus total imports.

5 Total exports (domestic) plus foreign) minus total imports.

6 Total exports (domestic) plus foreign) minus total imports.

Table 1.—Wheat, all: Acreage, production, value, exports, etc., United States, 1849, 1859, 1866-1931—Continued

				Price		Spring wheat,	No. 2 red winter	Foreign yea	trade, in r beginn	icluding f ing July	lour,
	Acre-	Aver- age yield	Produc-	per bushel re-	Farm value, basis	price per bushel	wheat, price per bushel			Net exp	orts
Year	har- vested	per acre	tiou	by pro- ducers Dec. 1	Dec. 1 farm price	at Chi- cago, year begin- ning July	at Chi- cago, year begin- ning July	Domes- tic ex- ports	Im- ports	Total	Per- cent- age of pro- duc- tion
1895 1896 1897	1,600 acres 40,848 43,916 46,046 51,007	Bush. 13.9 12.4 13.3 15.1	1,000 bushels 569, 456 544, 193 610, 254	Cts. 50.3 71.7 80.9 58.2	1,000 dolls. 286, 539 390, 346 493, 683 449, 022	Cts. 61 70 91 71	Cts. 62 67 86 90	1,000 bushels 130, 099 148, 767 221, 143 227, 240	1,000 bushels 2,117 1,545 2,060 1,875	1,000 bushels 130, 345 148, 725 220, 965 227, 300	Per cent . 22. 9 27. 3 36. 2 29. 4
1899 1899 1900	52, 589 52, 589 51, 387 52, 473	12.5 12.1 11.7 15.0	772, 163 658, 584 636, 051 602, 708 788, 638	58. 6 62. 0 62. 6	372, 982 373, 578 493, 766	70 75 74	8 72 76 72	190, 772 220, 653 239, 212	320 603 121	190, 749 220, 723 239, 137	30. 0 36. 6 30. 3
1902 1903 1904 1905	49, 649 51, 632 47, 825 49, 389	14.6 12.9 12.5 14.7	724, 808 663, 923 596, 911 726, 819	63. 0 69. 5 92. 4 74. 6	456, 851 461, 439 551, 788 542, 543	77 90 114 89	75 83 100 888	207, 835 124, 977 46, 319 101, 089	1, 080 229 3, 296 273	208, 016 124, 926 43, 612 100, 849	28.7 18.8 7.3 13.9
1905 1906 1907 1908	47, 800 45, 116 45, 970	15.8 14.1 14.0	756, 775 637, 981 644, 656 683, 379	66. 2 86. 5 92. 2	501, 316 552, 074 594, 128	84 107 116	77 90 96	150, 597 166, 525 116, 373	602 530 475	150, 594 166, 304 115, 901	19. 9 26. 1 18. 0
1909 1910 1911 1912	44, 263 44, 262 45, 681 49, 543 45, 814	15.4 15.8 13.9 12.5 15.9	700, 434 635, 121 621, 338 730, 267	98. 4 88. 3 87. 4 76. 0	689, 108 561, 051 543, 063 555, 280	114 107 110 94	110 102 90 103	89, 173 71, 338 81, 891 145, 159	845 1, 175 3, 445 1, 304	88, 465 70, 164 78, 447 143, 938	12.6 11.0 12.6 19.7
1913 1914 1915 1916	50, 184 53, 541 60, 469 52, 316	15. 2 16. 6 17. 0 12. 2	763, 380 891, 017 1, 025, 801 636, 318	79. 9 98. 6 91. 9 160. 3	610, 122 878, 680 942, 303 1, 019, 968	93 132 120 196	88 108 113 168	147, 955 335, 702 246, 221 205, 962	2, 402 728 7, 254 24, 960	146, 306 335, 162 239, 591 181, 067	19. 2 37. 6 23. 4 28. 5
1917 1918 1919	45, 089 59, 181 73, 099 75, 694	14.1 15.6 12.9 12.8	636, 655 921, 438 945, 403 967, 979	200. 8 204. 2 214. 9	1, 278, 112 1, 881, 826 2, 080, 056	227 234 276	225 222 224	132, 579 287, 402 222, 030	31, 215 11, 289 5, 511	102, 775 276, 615 216, 671	16. 1 30. 0 22. 4
1920 1921 1922 1923	61, 143 63, 696 62, 317 59, 650	13.6 12.8 13.9 13.4	833, 027 814, 905 867, 598 797, 394	143.7 92.6 100.7 92.3	1, 197, 263 754, 834 873, 412 736, 006	198 136 122 119	223 125 114 102	369, 313 282, 566 224, 900 159, 880	57, 682 17, 375 20, 031 28, 079	312, 625 265, 590 205, 079 131, 892	37, 5 32, 6 23, 6 16, 5
1924 1924 1925 1926	50, 862 52, 535 52, 367 56, 359	15.7 16.5 12.9 14.8	800, 877 864, 428 676, 765 831, 381	129. 9 141. 6 119. 8	1, 123, 086 958, 364 996, 308	155 166 140	158 164 138	260, 803 108, 035 219, 160	6, 201 15, 679 13, 264	254, 695 92, 669 205, 994	29. 5 13. 7 24. 8
1927 1928 1929 1930	58, 784 58, 272 62, 671 61, 138	14.9 15.7 13.0	878, 374 914, 876 812, 573	111. 5 97. 0 103. 5 60. 0	979, 813 887, 184 841, 385 514, 847	140 118 127 84	140 138 130	206, 259 163, 687 153, 245 131, 536	15, 734 21, 442 12, 956 19, 059	190, 578 142, 301 140, 361 112, 496	21. 7 15. 6 17. 3 13. 1
1931 10	54, 949			44.3	395, 600	<u> </u>	ļ		12,000	122,200	

<sup>Weighted average for 11 months.
Weighted average for 10 months.
Preliminary.</sup> 

Table 2.—Wheat, winter and spring: Acreage sown and harvested, and production, United States, 1910–1931

		Winte	r wheat		Dī	rum wh	eat	Other	spring	wheat
Year	Acreage sown in preced- ing fall	TCLOSES	Average yield per acre	Produc- tion	Acreage har- vested	Average yield per acre	Pro- duction	har-	Average yield per acre	Pro- duction
1910	33, 229 33, 274 37, 158 42, 431 39, 245 38, 359 43, 126 51, 483 44, 661 45, 625 47, 930 46, 091 38, 916 39, 951 39, 887	1,000 acres 27,329 29,162 26,571 31,699 36,008 41,308 43,709 27,257 37,130 40,016 43,414 42,358 38,508 31,366 31,368	Bushels 15.9 14.8 15.1 16.5 19.0 16.3 13.8 13.8 14.5 16.6 6 12.8 17.0	434, 142 430, 656 399, 919 523, 561 684, 990 673, 947 480, 553 412, 901 565, 099 760, 316 586, 878 571, 777 592, 259 402, 070 627, 433	2, 396 3, 313 3, 782 4, 409 5, 276 5, 792 5, 295 3, 826 4, 774	Bushels 	28, 009 50, 235 30, 996 48, 200 53, 324 87, 669 52, 834 62, 373 61, 651 43, 981	1,000 acres 	12.8 16.3 8.2 10.4 10.7 13.6 11.6 16.1 11.1	
1927 1928 1929 1930 1931	43, 340	37, 723 36, 213 40, 580 39, 509 41, 009	14. 7 16. 0 14. 2 15. 2 19. 2	552, 747 578, 673 577, 009 601, 840 787, 465	5, 484 6, 836 5, 571 4, 745 2, 869	14. 4 14. 2 9. 8 12. 2 6. 4	79, 100 97, 291 54, 710 57, 719 18, 395	15, 577 15, 223 16, 520 16, 884 11, 071	15. 8 15. 7 10. 9 11. 8 7. 8	246, 52 238, 91 180, 85 198, 60 86, 41

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

Table 3.—Winter wheat: Percentage of acreage abandoned, average 1919-1928, annual 1927-1931 1

State	A ver- age, 1919- 1928	1927	1928	1929	1930	1931	State	A ver- age, 1919- 1928	1927	1928	1929	1930	1981
N. Y N. J Pa. Ohio. Ind. III Mich. Wis. Minn. Iowa. Mo. S. Dak Nebr Kans Del Md Va. W. Va. N. C S. C Ga.	P.ct. 3.48 13.20 11.76 11.85 11.85 17.60 13.94 2.37 4.82 10.21	P.ct. 1.00 2.50 3.05 2.25 2.50 11.00 2.1.50 6.00 8.00	P. ct. 6.00 64.00 65.00	P. 21.0005500000000000000000000000000000000	P. 8.1.5.5000000000000000000000000000000000	4.5500055500550055500 0.0041110114331124125622123	Ky	P.ct. 13.8 7.7 8.5 21.7 9.5 16.4 26.4 10.0 21.9 23.3 14.8 9.2 16.8	P. ct. 3.0 5.0 10.0 120.0 220.0 24.0 12.0 30.0 12.0 30.0 1.0 30.0 1.0 30.0 1.0 30.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	P. ct. 65.0 28.0 15.0 40.0 7.0 23.0 15.0 40.0 45.0 1.0 2.0 6.0 9.0 23.5	P.ct. 3.0 4.0 3.0 10.0 6.0 7.0 15.0 20.0 20.0 2.5 1.5 10.0 3.0 6.4	P.ct. 3.5 4.0 4.0 14.0 15.0 23.8 4.0 15.0 24.0 22.1 3.0 28.0 10.0 9.4	P. ct. 3.0 1.5 1.0 2.5 4.5 50.0 4.0 22.0 15.0 0 4.0 5.0 38.0

<sup>&</sup>lt;sup>1</sup> Preliminary.

<sup>&</sup>lt;sup>1</sup> For entire season, planting to harvest. Includes winter abandonment, which is estimated on May 1 of each season.

Table 4.—Wheat, all: Acreage harvested and production, by States, average 1924-1928, annual 1928-1931

		Acres	ge harve	sted			P	roduction		
State and division	A ver- age, 1924- 1928	1928	1929	1930	19311	A verage, 1924- 1928	1928	1929	1930	1931 1
Maine Vermont New York New Jersey Pennsylvania	1,000 acres 5 1 306 58 1,129	1,000 acres 4 1 316 60 1,108	1,000 acres 2 1 242 54 987	1,000 acres 2 1 224 53 986	1,000 acres 2 1 211 49 909	1,000 bushels 114 28 5,599 1,215 20,450	1,000 bushels 80 16 4,702 1,200 17,171	1,000 bushels 46 18 3,864 1,107 17,278	1,000 bushels 44 20 4,086 1,246 21,682	1,000 bushels 44 21 5,311 1,323 19,987
North Atlantic		1, 489	1, 286	1, 266	1, 172	27, 408	23, 169	22, 313	27, 078	26, 686
Ohlo	1,559 9,763 2,685	872 910 1,583 887 104 1,532 452 1,511 10,810 8,380 8,672 10,473	1, 564 1, 568 2, 093 790 96 1, 421 426 1, 534 10, 440 3, 583 3, 700 12, 081	1, 612 1, 584 1, 921 705 99 1, 366 432 1, 275 9, 896 3, 808 3, 939 12, 357	1,723 1,678 1,935 711 88 1,224 381 1,497 6,204 2,796 3,465 12,632	27, 335 25, 302 34, 737 17, 232 2, 587 27, 366 8, 096 20, 054 121, 692 31, 783 55, 300 135, 319	9, 475 10, 040 22, 939 14, 202 2, 141 22, 964 8, 723 19, 194 155, 358 34, 928 69, 919 177, 833	30, 503 25, 909 30, 831 13, 682 1, 881 20, 471 7, 977 15, 400 99, 950 34, 799 55, 403 148, 544	28, 712 28, 527 35, 086 16, 160 2, 063 22, 626 8, 869 17, 838 108, 471 45, 279 71, 557 166, 702	50, 744 43, 327 45, 076 18, 446 1, 544 18, 011 7, 594 29, 933 32, 717 15, 831 58, 376 239, 868
North Central-	35, 631	36, 146	39, 296	38, 994	34, 334	508, 804	547, 716	485, 350	551, 890	561, 467
Delaware Maryland Virginia West Virginia North Carolina . South Carolina . Georgia	101 514 661 132 439 59 100	102 530 673 122 444 64 94	108 506 657 104 353 52 48	105 481 591 105 265 34 26	91 404 603 113 339 53 49	1, 885 9, 638 9, 373 1, 826 5, 211 723 1, 101	1, 836 8, 745 9, 758 1, 586 5, 150 800 1, 034	2, 014 9, 108 8, 607 1, 362 3, 636 520 408	2, 048 11, 063 9, 160 1, 838 2, 862 340 273	2, 138 9, 696 13, 266 2, 373 4, 407 689 637
South Atlantic	2,006	2, 029	1,826	1,607	1, 652	29, 756	28, 909	25, 655	27, 584	33, 206
Kentucky Tennessee Alabama Mississippi	413	125 422 4 8	204 280 2	202 202 2	242 252 4	2, 773 4, 635 70 76	1, 000 3, 714 44 60	2, 530 2, 492 20	2, 828 2, 222 20	4, 840 4, 410 50
Mississippi Arkansas Oklahoma Texas	3,867 1,570	22 4,413 2,016	4, 576 2, 970	18 3, 935 3, 029	36 4, 407 3, 635	350 50, 568 20, 944	258 59, 576 22, 176	158 51, 251 44, 550	203 37, 382 31, 804	475 74, 919 57, 433
South Central	6, 112	7,005	8,049	7, 388	8, 576	79, 414	86, 823	101,001	74, 459	142, 127
Montana Idaho Wyoming Colorado New Mexico Arizona Utah Nevade Washington Oregon California	1, 026 193 1, 374 157 41 234 16 2, 112 994 645	4, 275 1, 160 243 1, 339 186 47 257 18 2, 271 1, 027 780	4, 419 1, 294 841 1, 539 320 19 265 14 2, 295 1, 075 633	4, 217 1, 245 343 1, 632 211 22 276 13 2, 305 1, 027 592	2, 182 1, 059 243 1, 394 284 24 257 14 2, 357 945 458	2, 364 1, 015 5, 490 424 42, 922 20, 478 11, 830	77, 998 28, 792 3, 897 18, 564 2, 054 1, 269 6, 861 482 48, 644 23, 318	41, 290 28, 835 4, 394 17, 934 4, 435 5, 304 352 42, 721 21, 500 11, 014	35, 313 30, 691 4, 014 23, 356 1, 904 616 6, 892 328 38, 278 23, 621 12, 138	14, 684 19, 641 2, 146 16, 552 5, 112 672 4, 679 40, 843 17, 662 6, 475
Western			12, 214	11,883	9, 215		228, 259	178, 254	177, 149	128, 785
United States	- 55 <b>, 663</b>	58, 272	62, 671	61, 138	54, 949	833, 165	914, 876	812, 573	858, 160	892, 271

<sup>1</sup> Preliminary.

Table 5.—Wheat, winter: Acreage harvested and production, by States, average 1924-1928, annual 1928-1931

		Acre	age harv	ested			P	roduction	ı	
State and divi- sion	Aver- age, 1924- 1928	1928	1929	1930	1931 1	A verage, 1924– 1928	1928	1929	1930	1931 1
New York New Jersey Pennsylvania	1,000 acres 297 58 1,124	1,000 acres 306 60 1,101	1,000 acres 233 54 976	1,000 acres 214 53 976	1,000 acres 201 49 898	1,000 bushels 5,431 1,215 20,375	1,000 bushels 4,529 1,200 17,066	1,000 bushels 3,728 1,107 17,080	1,000 bushels 3,916 1,246 21,472	1,000 bushels 5, 126 1, 323 19, 756
North Atlantic	1, 479	1, 467	1, 263	1, 243	1, 148	27, 021	22, 795	21, 915	26, 634	26, 205
Ohio Indiana Illinois Michigan Wisconsin Minnesota Iowa Missouri South Dakota Nebraska Kansas	1, 546 1, 569 2, 054 888 62 156 388 1, 548 104 3, 038 9, 782	864 900 1, 261 882 42 165 411 1, 496 105 3, 492 10, 433	1, 554 1, 553 1, 978 780 30 162 379 1, 522 75 3, 506 12, 034	1, 601 1, 569 1, 800 694 32 167 387 1, 263 96 3, 751 12, 310	1,713 1,663 1,836 701 24 152 333 1,490 185 3,339 12,618	27, 219 25, 199 32, 078 17, 138 1, 357 3, 024 7, 552 19, 906 1, 361 52, 456 135, 180	9, 331 9, 900 17, 654 14, 112 777 2, 640 8, 014 18, 999 1, 260 66, 697 177, 361	30, 303 25, 624 28, 681 13, 494 660 3, 402 7, 201 15, 220 1, 065 52, 590 148, 018	28, 498 28, 242 32, 400 15, 962 656 3, 340 8, 127 17, 682 1, 632 68, 643 166, 185	50, 534 43, 072 43, 146 18, 226 3, 192 6, 826 29, 800 1, 166 57, 431 239, 742
North Central	21, 133	20, 051	23, 573	23, 670	24,054	322, 471	326, 745	326, 258	871, 867	493, 591
Delaware	101 514 661 132 439 59 100	102 530 678 122 444 64 94	106 506 657 104 853 52 48	105 481 591 105 265 34 26	91 404 608 113 339 53 49	1, 885 9, 638 9, 373 1, 826 5, 211 723 1, 101	1, 836 8, 745 9, 758 1, 586 5, 150 800 1, 034	2, 014 9, 108 8, 607 1, 362 3, 636 520 408	2,048 11,063 9,160 1,838 2,862 340 273	2, 138 9, 696 13, 266 2, 373 4, 407 689 637
South Atlantic	2,006	2, 029	1,826	1,607	1,652	29, 756	28, 909	25, 655	27, 584	33, 206
Kentucky Tennessee Alabama Mississippi Arkansas	413 6 5	125 422 4 3 22	204 280 2	202 202 2	242 252 4	2, 773 4, 635 70 76 350	1,000 3,714 44 60 253	2, 530 2, 492 20	2, 828 2, 222 20 203	4, 840 4, 410 50
Oklahoma Texas		4, 413 2, 016	4, 576 2, 970	3, 935 3, 029	4,407 3,635	50, 566 20, 944	59, 576 22, 176	51, 251 44, 550	37, 382 31, 804	74, 919 57, 433
South Central.	6, 112	7, 005	8, 049	7, 388	8, 576	79, 414	86, 823	101, 001	74, 459	142, 127
Montana Idaho Wyoming Colorado New Mexico Arizona Utah Nevada Washington Oregon Cahfornia	148 4 1,014 751	803 456 75 923 150 47 162 4 1,424 837 780	624 703 132 1, 204 288 19 185 4 1, 151 926 633	686 731 161 1,324 181 22 194 2 875 833 592	412 673 161 1,218 257 24 194 3 1,356 825 456	9, 489 10, 253 777 13, 289 1, 826 1, 015 2, 940 100 24, 306 16, 150 11, 830	12, 045 10, 488 1, 125 11, 076 1, 500 1, 269 3, 726 104 85, 600 20, 088 16, 380	9, 048 14, 060 1, 782 13, 244 3, 917 475 2, 960 1112 27, 048 18, 520 11, 014	6, 380 16, 813 2, 012 19, 198 1, 484 616 4, 268 42 19, 688 19, 159 12, 136	4, 120 12, 114 1, 449 14, 616 4, 626 672 3, 104 66 29, 832 15, 262 6, 475
Western	4, 854	5, 661	5, 869	5, 601	5, 579	91, 975	113, 401	102, 180	101, 796	92, 336
United States.	35, 585	36, 213	40, 580	39, 509	41,009	550, 636	578, 673	577, 009	601,840	787, 465

<sup>&</sup>lt;sup>1</sup> Preliminary.

Table 6.—Wheat, spring: Acreage harvested and production, by States, average 1924-1928, annual 1928-1931

# SPRING WHEAT OTHER THAN DURUM

		Acr	eage harv	rested			F	roduction	1	
State and divi- sion	A ver- age, 1924- 1928	1928	1929	1930	1931 1	Average, 1924- 1928	1928	1929	1930	1931 1
Maine Vermont New York Pennsylvania	1,000 acres 5 1 9	1,000 acres 4 1 10 7	1,000 acres 2 1 9	1,000 acres 2 1 10 10	1,000 acres 2 1 10 11	1,000 bushels 114 28 168 2 125	1,000 bushels 80 16 173 105	1,000 bushels 46 18 136 198	1,000 bushels 44 20 170 210	1,000 bushels 44 21 185 231
North Atlantic	20	22	23	23	24	385	374	398	444	481
Ohio Indiana Illinois Michigan Wisconsin Minnesota Iowa Missouri North Dakota South Dakota Nebraska Kansas	1, 472 34 10	8 10 302 5 62 1,032 41 15 5,660 1,933 180 40	10 15 115 10 68 1,038 47 12 6,590 2,038 194 47	11 15 121 11 67 996 45 12 6,854 2,242 188 47	10 15 99 10 64 946 48 7 4,318 1,774 126	116 102 2, 659 94 1, 230 21, 042 544 149 68, 948 18, 187 2, 844 139	144 140 5, 285 90 1, 364 14, 964 709 195 78, 108 19, 523 3, 222 472	200 285 2, 150 188 1, 221 13, 909 776 180 62, 605 19, 769 2, 813 526	214 285 2,686 198 1,407 15,936 742 156 71,967 26,007 2,914 517	210 255 1, 980 220 1, 088 13, 055 768 133 21, 590 9, 225 945 126
North Central	9, 498	9, 288	10, 182	10,609	7, 431	116, 054	124, 216	104, 622	123, 029	49, 545
Montana Idaho Wyoming Colorado New Mexico Utah Nevada Washington Oregon	34 86 12	3, 443 704 168 416 36 95 14 847	3, 765 591 209 335 32 80 10 1, 144 149	3, 501 514 182 308 30 82 11 1, 430 194	1,750 386 82 176 27 63 11 1,001 120	47, 865 15, 327 2, 555 5, 106 537 2, 550 325 18, 617 4, 328	65, 417 18, 304 2, 772 7, 488 554 3, 135 378 13, 044 3, 230	82, 002 14, 775 2, 612 4, 690 518 2, 344 240 15, 673 2, 980	28, 708 13, 878 2, 002 4, 158 420 2, 624 286 18, 590 4, 462	10, 500 7, 527 697 1, 936 486 1, 575 253 11, 011 2, 400
Western	5, 520	5, 913	6, 315	6, 252	3, 616	97, 210	114, 322	75, 834	75, 128	86, 385
United States.	15, 038	15, 223	16, 520	16, 884	11,071	213, 649	238, 912	180, 854	198, 601	86, 411
		<u></u>	<u>'</u>	DURU	M WHE	AT	<u> </u>	l	L	<u> </u>
Minnesota North Dakota South Dakota Montana	3, 821 966 40	335 5, 150 1, 322 29	221 3,850 1,470 30	208 3, 042 1, 470 30	126 1,886 837 20	3, 300 52, 743 12, 238 600	5, 360 77, 250 14, 145 536	3, 160 37, 345 13, 965 240	3, 350 36, 504 17, 640 225	1, 784 11, 127 5, 440 64
4 States	5, 040	6, 836	5, 571	4,745	2, 869	68, 879	97, 291	54, 710	57, 719	18, 395

<sup>&</sup>lt;sup>1</sup> Preliminary. <sup>1</sup> 3-year average.

Table 7.—Wheat: Yield per acre and estimated price per bushel December 1, by States, averages, and annual 1926-1931

ALL WHEAT, INCLUDING DURUM

			Yield	l per	acre			Esti	nated	l price	e per	bush	el, De	ec. 1
State and division	Av- er- age, 1919– 1928	1926	1927	1928	1929	1930	1931	Av- er- age, 1925- 1929	1926	1927	1928	1929	1930	1931
Maine	Bus. 22.1 18.9 19.3 19.8 18.0	22.0	20.9 23.0	16. 0 14. 9	18.0 16.0 20.5	20 0	21. 0 25. 2 27. 0	136 134 129	Cts. 175 132 132 132 129	Cts. 175 140 125 125 127	Cts. 165 131 137 124 129	Cis. 150 125 124 123 121	79 87 80	Cts. 70 80 57 57 56
North Atlantic	18, 4	19. 6	19. 2	15. 6	17.4	21. 4	22.8	131. 3	129. 8	126. 6	130. 4	121, 7	80.4	56.4
Ohio Indiana Illinois Michigan Wisconsin Minnesota Iowa North Dakota South Dakota Nebraska Kansas	16. 2 14. 8 16. 2 17. 8 18. 2 13. 1 18. 7 10. 8 10. 7 15. 4 18. 2	20. 0 18. 0 18. 3 20. 3 12. 9 21. 4 15. 3 8. 0 6. 1 13. 0	15. 5 13. 9 21. 5 21. 7 11. 9 18. 7 10. 0 12. 7 14. 9	11. (14. (16. (17. (17. (17. (17. (17. (17. (17. (17	16. 8 7 14. 7 17. 8 19. 6 14. 4 18. 7 10. 6 9. 6 9. 7 15. 6	18. 18. 22. 20. 16. 20. 14. 11. 11.	25. 8 23. 8 25. 9 17. 14. 19. 9 20. 6 5. 16.	3 128 3 123 5 119 7 114 9 116 9 126 8 106 7 106 3 112	122 122 126 123 120 124 117 118 117	117 110 117 122 103 106 109	131 124 112 128 106 96 100 121 81 85 94	106 106 113 96 98	71 69 73 73 58 58 58 58 51 51 51 51	58 55 45 45 45 50 48 40
North Central	13, 1	13. 8	13.	15.	2 12.	14.	16.	114.2	120. 3	112, 2	93. 7	102.	57,8	42,4
Delaware Maryland Virginia West Virginia North Carolina South Carolina Georgia	13.	23. 0 16. 8 2 16. 0 7 14. 1	17. 12. 13. 10.	5 16. 2 14. 3 13. 7 11. 0 12.	5 18. 5 13. 0 13. 6 10. 5 10.	23. 1 15. 1 17. 3 10. 0 10.	0 24. 5 22. 5 21. 8 13. 0 13.	0 131 0 137 0 140 0 150 0 160	131 134 143 154	127 132 5 137 6 144 5 155	127 137 137 152 161	118 121 131 14 15	3 77 5 97 3 100 1 100 0 13	52 58 61 72 83
South Atlantic	. 13.	17.	13.	3 14.	2 14.	0 17.	2 20.	1 138.	134.	134.	136.	125.	5 89.	9 59.1
Kentucky	10. 10. 14. 11.	18.0 8 13.4 9 17.0 8 13.4 7 17.	7. 10.	0 8. 6 11. 0 20. 5 11. 0 13.	8 8. 0 10. 0 5 9. 5 11.	9 11. 0 10.	0 17. 0 12. 3 13. 5 17.	5 14: 5 16: 13: 2 18: 0 11:	13 16 12 12 1 12 7 11	8 13 0 15 9 13 8 12 8 12	14 5 15 5 13 5 12 6 10	13 7 15 7 12 12 9	2 10 2 13 9 9 9 5	65 80 8 52 9 38
South Central	_	17.	7 9.	1 12.	4 12.	5 10.	1 16.	6 120.	120.	4 122.	105.	0 103.	2 66.	3 40.7
Montana Idaho Wyoming Colorado New Mexico Arizona Utah Nevada Washington Oregon California	13. 23. 16. 13. 24. 21. 24. 19. 20.	ol on .	6 27. 8 18. 7 14. 7 10. 2 25. 2 25. 2 25. 2 25.	6 24. 5 16. 2 13. 4 11. 0 27. 5 26. 8 21. 1 22.	8 22. 9 11. 9 11. 0 25. 7 20. 8 25. 4 18. 7 20.	8 24. 9 11. 7 14. 9 9. 0 25. 1 25. 6 16. 0 23.	7 18. 3 11. 0 28. 0 18. 2 22. 6 17. 0 18.	5 10 8 9 9 10 0 11 0 14 2 10 8 12 3 11 7 11	3 10 5 10 5 10 8 11 1 13 7 10 8 11 2 11 6 12	6 99 7 10 0 11 0 13 5 10 6 12 6 10 0 11	8 9 4 8 9 10 5 13 2 9 5 12 8 10 2 10	0 9 3 8 7 9 7 9 10 13 8 10 2 12 0 10 3 11	15 5 19 5 13 5 15 10 12 6 12 10 17 5	2 46 0 46 3 43 1 45 5 66 6 54
Western	_ 17.		6 21.	8 19.	7 14.	6 14.	9 14.	0 109.	2 113.	4 103.	1 93.	4 101.	3 56.	3 50.4
United States	14.	1 14.	8 14.	9 15.	7 13.	0 14	0 16.	2 114.	7 119.	8 111.	5 97.	0 103.	5 60.	0 44.3
		_1	<u> </u>				DU	RUM	<u>,                                     </u>	_1				·
Minnesota North Dakota South Dakota Montana	14. 12. 12. 12.	2 9. 4 6.	5 14. 6 16.	0 15. 5 10.	9.	7 12 5 12	0 5.	0 9 5		10 10 10 10	0 7 2 7 7 8	3	89 85 88	51 50 16 46 12 43 12 48
Average	. 12	3 9.	2 14.	4 14	2 9.	8 12	2 6.	4	<u></u>	- 100.	6 71.	9 88.	. 4 45	1 45. 5
							-							

TABLE 8.—Wheat: Acreage, yield per acre, and production in specified countries, average 1921–22 to 1925–28, annual 1928–29 to 1931–32

			Acreege				Ā	Yield per acre	2		1	P4	Production		
Country	Average 1921-22 to 1926-28	1928-29	1929-30	1030-31	1931~321	Average 1921-22 to 1925-26	1928-29	1929-30	1930-31	1931-321	Average 1921-22 to 1925-26	1928-29	1929-80	1830-31	1931-321
North America: Canada United States. Martico Guatemala.	1,000 acres 22,088 58,115 2,088 2,088	1,000 acres 24,119 68,272 1,283	1,000 acres 25,255 62,671 1,293 1,293	1,000 acres 24,898 61,138 1,216 1,216	1,000 acres 26,115 64,949 1,424	Bushels 13.8 5.0 9.2	Bushels 23.5 15.7 8.6 8.4	Bushels 12.1 13.0 8.8 10.4	Bushels 16.9 14.0 9.4 8.1	Bushels 11. 6 16. 2 11. 1	1,000 bushels 306,483 804,218 10,388	1,000 bushels 566,728 914,876 11,031	1,000 bushels 304,620 812,573 11,333	1,000 bushels 420,672 858,180 11,446	1,000 bushels 804,144 892,271 15,778
Europe: Unided Kingdom— England and Wales_ Bootland Northern Treland Iriah Free State Northern Treland Carnany Austria Carnany Austria Carnany Austria Careaca Greece	1, 83 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	1.		4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4	1. 2111.12. 0. 1.4.0. 4.8.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.	路路は路路路社は路北江路北北路路路北江東路路は北京北江市市である日本市の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の	<ul><li>総数</li><li>総数</li><li>総数</li><li>3</li><li>3</li><li>3</li><li>4</li><li>3</li><li>3</li><li>4</li><li>4</li><li>4</li><li>5</li><li>6</li><li>6</li><li>6</li><li>7</li><li>6</li><li>6</li><li>7</li><li>6</li><li>7</li><li>6</li><li>7</li><li>6</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7</li><li>7<!--</td--><td></td><td><b>微镜线线线线位线设计设设计线机线线线设计设计线点线线</b> </td><td>888</td><td>82.4 - 1 52.9 82.1 82.1 82.2 82.2 82.2 82.2 82.2 82.2</td><td>72, 42, 13, 13, 13, 13, 13, 13, 13, 13, 13, 13</td><td>74, 74, 64, 11, 12, 12, 12, 12, 12, 12, 12, 12, 12</td><td>36, 96, 97, 128, 128, 128, 128, 128, 128, 128, 128</td><td>267.1.207.1.207.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2</td></li></ul>		<b>微镜线线线线位线设计设设计线机线线线设计设计线点线线</b> 	888	82.4 - 1 52.9 82.1 82.1 82.2 82.2 82.2 82.2 82.2 82.2	72, 42, 13, 13, 13, 13, 13, 13, 13, 13, 13, 13	74, 74, 64, 11, 12, 12, 12, 12, 12, 12, 12, 12, 12	36, 96, 97, 128, 128, 128, 128, 128, 128, 128, 128	267.1.207.1.207.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2

Finland Russia.	36 43, 128	71,956	81,000	83, 792	92,854	9.8	21.7	22.5	23.7	24.7	739	998 795, 235	702, 851	1, 084, 000	1, 161
Estimated European total, excluding Russia	66, 400	71, 400	70, 100	73, 500	75,300						1, 196, 000	1, 410, 000	1, 450, 000	1, 368, 000	1, 435, 000
Africa: Morocco. Algeria Tunis Egypt.	2, 272 3, 406 1, 425 1, 462	2, 665 3, 656 1, 590	3, 011 3, 795 1, 732 1, 614	2, 957 4, 027 1, 922 1, 522	2, 732 3, 535 1, 927 1, 649	9.6 7.8 5.5 25.2	9.3 8.3 6.7	10.5 8.8 7.1 28.0	7.2 8.1 5.4 26.1	12.7 8.4 7.2 27.9	21, 758 26, 716 7, 892 36, 806	24, 749 30, 339 13, 595 37, 296	31, 764 33, 307 12, 309 46, 228	21, 302 32, 439 10, 398 39, 753	34, 708 29, 578 13, 962 46, 071
Asis: Turkey India	27,058 29,560	7, 112 32, 193	5, 947 31, 973	6, 393 31, 654	32, 181	15.6	8.3 9.0	16.8	13.9	10.8	2 39, 510 336, 269	59, 196 290, 864	99, 900 320, 731	89, 033 390, 843	347, 275
ausse Empire Japan Chosen Palwan Kwantang	1, 197	1,201 896 1	1,213	1, 204 848 1	1,231	22.5 11.6 9.1 11.8	25.7 15.0 8.0	25.1 9.5 13.0	24.5 10.6 15.0 15.3	25.1	26,899 10,208 64 47	30, 812 8, 595 15 32	30, 496 8, 320 13 35	29, 538 8, 985 13 46	30, 892
Estimated Asiatic total, excluding Russia and China	38, 600	43, 500	42,000	42, 300	42,400						437, 000	409, 000	491, 000	553, 000	525,000
Estimated Northern Hemisphere total, ex- cluding Russia and China	195, 900	208, 700	211, 600	213, 800	210, 200						2, 908, 000	3, 419, 000	3, 194, 000	3, 317, 000	3, 297, 000
SOUTHERN HEMISPHERE															
Chile Uruguay Argontina Union of South Africa	1,446 867 16,932 868	1,715 1,085 22,428 825	1,724 1,097 15,903 942	1, 609 864 19, 675 1, 137	1, 517 1, 154 17, 295	17.8 11.2 12.0 8.6	17.3 11.3 8.8 8.8	19.4 10.2 11.8	8488 8400	10.2	25, 761 9, 680 203, 388 7, 461	29, 679 12, 304 349, 051 7, 238	33, 529 13, 157 162, 576 11, 140	21, 190 7, 218 235, 960 10, 150	11,769 218,623 12,188
Southern Rhodesia. Australia. New Zealand.	10,01	14,840 255	14, 977 14, 336	8, 213 221	13,990	47.8 12.8 29.6	7.7 10.8 34.6	30.7	32,7 20,0	12.2	128, 520 6, 640	159, 679 8, 833	126, 885 7, 240	212, 629 7, 073	170, 966
Estimated Southern Hemisphere total	31,000	42, 600	40, 500	44, 200	36, 200		:		:	:	390, 000	580, 000	368, 000	504, 000	452,000
Estimated world total, excluding Russia and China	226, 900	251, 300	252, 100	258, 000	216, 400						3, 298, 000 3, 999, 000 3, 562, 000	3, 999, 000	3, 562, 000	3, 821, 000	3, 749, 000

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus for 1930-31 the crop harvested in the Northern Hemisphere sphere countries in 1930 is combined with the Southern Hemisphere harvest which begins lake in 1930 and ends early in 1931. 4 3-year average. Area sown.

Year 1925.

<sup>1</sup> Preliminary.

Table 9.-Wheat: World production, 1890-91 to 1931-32

		North-		•		Selec	ted cour	itries		
Crop year	World produc- tion ex- cluding Russia and China	ern Hemisphere production ex- cluding Russia and China	tion ex-	Russia <sup>1</sup>	United States	Canada	India	Argen- tina	Austra- lia	France
1890-91 1891-92 1892-93 1893-94 1894-95 1895-96 1896-97 1897-93 1899-99 1899-99 1900-01 1900-01 1901-02 1902-03 1903-04 1904-05 1906-07 1907-08 1908-09 1908-190 1908-190 1908-190 1908-190 1908-190 1908-190 1908-190 1908-190 1908-1908-1908-1908 1908-1908-1908-1908 1908-1908-1908-1908 1908-1908-1908-1908 1908-1908-1908-1908-1908 1908-1908-1908-1908-1908-1908-1908-1908-	2,076 2,128 2,128 2,128 2,128 2,128 2,128 2,129	Affilion bushels 1,802 1,938 1,938 2,938 1,938 2,038 2,1886 2,188	Million bushels 1, 056 1, 095 1, 045 1, 095 1, 057 1, 103 1, 105	Million bushels 1212 173 3255 3355 3355 3410 4423 4423 4423 4454 454 455 667 6636 5643 5671 6626 836 563 846 856 836 563 846 8571 622 205 243 4419 472 782 7914 785 793 1,084	Million bushels 585 528 428 556 5528 4286 5610 7772 636 603 789 564 557 7727 757 664 565 621 763 636 631 1,026 635 621 1,026 635 621 1,026 635 621 763 838 838 839 838 838 838 838 838 838 83	Affilion bushels 42 42 48 411 33 47 63 56 85 57 56 80 106 128 112 167 132 231 2231 231 224 232 161 400 407 480 567 305 421 304	Million bushels 229 227 226 227 226 227 226 227 226 220 227 226 220 227 227 229 225 227 229 227 229 227 229 227 229 227 229 227 229 227 229 227 229 227 229 227 229 229	Million bushels 31 36 59 82 55 31 105 105 106 107 157 157 157 157 157 157 157 157 157 15	Million bushels 27 28 33 37 28 18 21 22 28 411 28 411 28 411 28 41 19 10 10 10 10 10 10 10 10 10 10 10 10 10	Million bushels 330 330 3311 278 344 340 340 340 345 363 363 363 363 377 359 382 265 5 135 223 223 225 229 187 231 231 231 231 231 231 231 231 231 231

Bureau of Agricultural Economics. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus for 1930-31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931.

Includes all Russian territory reporting for years named.
 Total Russian Empire exclusive of the 10 Vistula Provinces of Russian Poland and the Province of Batum in Transcaucasia.
 Exclusive of Russian Poland, Lithuania, parts of present Latvia and Ukraine, and 2 Provinces of Transcaucasia.

caucasia.

<sup>4</sup> Beginning with this date estimated production is within present boundaries of the Union of Socialist Soviet Republics, excluding Turkestan, Transcaucasia, and the Far East, which regions in 1924 produced 51,706,000 bushels, and in 1925, 58,000,000 bushels.

<sup>4</sup> Beginning with this date production is within postwar boundaries and therefore not comparable with earlier years.

<sup>6</sup> Preliminary.

Table 10.—Wheat, all: Monthly marketings by farmers, as reported by about 3,500 mills and elevators, United States, 1921-22 to 1930-31

#### Percentage of year's receipts

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Мау	June	Sea- son
1921-22 1922-23 1923-24 1924-25 1924-25 1925-26 1926-27 1927-28 1928-29 1929-30 1930-31	19. 1 14. 8 13. 4 13. 6 14. 6 21. 8 15. 4 17. 9 26. 7 24. 2	18. 2 17. 8 17. 6 19. 8 18. 6 20. 3 18. 6 18. 6 23. 4 20. 7	16. 4 14. 2 16. 7 17. 5 18. 7 13. 2 19. 6 17. 0 13. 5 12. 1	10.6 12.0 13.7 14.5 10.9 10.0 12.6 11.6 8.1 6.9	6.8 8.6 9.5 8.6 5.8 7.7 7.0 4.5 4.0	5.4 7.4 6.2 5.6 7.0 5.6 5.4 4.8	4.4 5.5 4.6 5.3 4.7 4.6 4.5 3.8 3.0 4.6	4.9 5.1 4.8 4.2 4.0 4.6 4.1 4.8 2.8 4.8	3.9 4.8 8.3 2.5 3.6 3.6 3.8 2.3 3.6	3.2 3.7 2.9 1.6 3.0 2.4 2.5 2.5 2.4 3.3	3.5 3.4 3.7 3.1 2.9 3.2 2.5 2.6 4.0	3.6 3.7 3.6 3.7 4.0 5.5 3.1 5.9 6.2 7.0	100. 0 100. 0 100. 0 100. 0 100. 0 100. 0 100. 0 100. 0 100. 0

Bureau of Agricultural Economics.

Table 11.-Wheat, all: Receipts inspected, by markets, 1922-23 to 1930-31

#### Year beginning July

Pierker	1922-23	1923-24	1924-25	1925–26	1926-27	1927-28	1928-29	1929-30	1930-31
Minneapolis Duluth Kansas City Chicago St. Louis Omaha Wichita Portland, Oreg New York Philadelphia Baltimore New Orleans Galveston All other inspection points Total	1,000 bushels 126,508 71, 154 77, 302 89, 207 22, 256 22, 368 36, 893 13, 434 24, 628 17, 400 224, 418	1,000 bushels 99, 366 38, 460 59, 948 43, 017 28, 859 19, 763 22, 151 36, 732 6, 252 16, 261 7, 055 213, 715	1,000 bushels 76,960 102,654 86,713 59,831 25,903 31,660 29,559 21,559 21,578 18,236 14,286 33,953 256,192	1,000 bushels 118, 730 67, 447 51, 571 19, 058 25, 148 16, 903 18, 972 27, 892 27, 892 2, 235 2, 769 201, 036	1,000 bushels 85,466 49,985 90,535 30,811 26,247 21,642 28,166 35,299 3,855 6,933 21,204 44,781 308,883	1,000 bushels 129,966 98,032 74,595 34,592 24,423 30,008 21,191 42,931 42,931 40,026 13,904 4,026 13,904 13,920 11,332 260,728	1,000 bushels 119, 605 89, 357 101, 190 25, 827 34, 718 34, 689 30, 584 27, 612 41, 102 1, 378 17, 854 5, 810 16, 572 346, 593	1,000 bushels 83, 291 41, 822 83, 123 28, 492 27, 763 31, 673 28, 986 26, 33, 23 1, 525 10, 035 22, 991 368, 688	1,000 bushels 97, 673 47, 011 90, 607 41, 821 31, 348 46, 907 28, 436 6, 707 2, 081 12, 182 8, 280 20, 222 345, 972
	i				]	1	1	1	

Bureau of Agricultural Economics. Compiled from reports of licensed inspectors through district offices of Federal grain inspection. The quantity loaded per car varies, but car-lot receipts have been converted to bushels by using a factor of 1,300 bushels to a car.

Table 12.—Wheat: Receipts inspected, all inspection points, United States, by months, 1917-18 to 1930-31

Crop	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Total
1917-18 1918-19 1919-20 1920-21	13, 347 66, 639 90, 870 65, 634 137, 839 87, 314 80, 391 91, 850 70, 715 158, 298 103, 236 145, 487 209, 371	40, 988 154, 683 151, 674 95, 897 147, 696 116, 431 104, 682 148, 100 75, 495 134, 553 118, 828 126, 043 152, 871	46, 192 140, 008 124, 209 102, 480 122, 571 91, 078 72, 726 125, 347 84, 804 90, 938 127, 067 114, 787 82, 242	61, 233 107, 875 89, 025 96, 562 87, 586 77, 083 65, 907 129, 769 49, 370 67, 998 104, 410 117, 295 57, 525	58, 479 69, 210 60, 875 75, 903 48, 424 76, 625 58, 718 84, 376 57, 292 51, 875 73, 841 78, 392 82, 495	bushels 33, 858 95, 515 48, 721 67, 392 76, 764 45, 287 49, 217 53, 128 42, 163 49, 513 40, 912	21, 947 45, 861 42, 514 64, 323 44, 283 62, 920 30, 216 37, 809 32, 040 42, 536 43, 417 41, 608 29, 461	bushels 15, 012 25, 528 32, 131 50, 272 46, 346 35, 863 37, 436 36, 642 30, 202 44, 334 40, 325 48, 536 85, 931	bushels 14, 984 32, 984 83, 190 46, 485 40, 635 38, 611 28, 772 31, 922 26, 305 40, 291 43, 928 45, 928 45, 663	13,878 23,826 29,611 59,762 28,398 34,857 21,568 25,310 35,014 81,061 81,494 22,629	bushels 13,494 28,809 39,638 60,271 44,347 30,698 31,078 28,179 29,206 40,579 38,214 36,536 30,615	12,408 18,936 43,375 68,307 40,039 29,662 29,020 32,341 43,857 43,636 24,606 51,173 55,812	1,000 bushels 345, 820 809, 874 785, 833 853, 238 841, 586 605, 245 813, 120 577, 724 792, 215 792, 446 892, 887 775, 527 805, 304

Bureau of Agricultural Economics. Compiled from reports of licensed inspectors through district offices of Federal grain inspection. The quantity loaded per car varies, but car-lot receipts have been converted to bushels by using a factor of 1,800 bushels to a car.

Table 13.—Wheat: Receipts inspected, all inspection points, by classes, and grades, 1926-27 to 1930-31

ass, and year beginning			Gr	ade			m
July	No. 1	No. 2	No. 3	No. 4	No. 5	Sample	Total
ard red spring:	1,000 bush.	1,000 bush.	1,000 bush.	1.000 bush.	1,000 bush.	1,000 bush	1,000 bush.
1926-27		29, 373	23, 823	17.677	4,114	10,706	136, 853
1927-28	106, 285	56, 839	41, 268	18, 763	6,200	11, 989	241, 294
8-20	110,602	36, 986	22, 562	8, 462 2, 759	4,625	40, 812	224, 049
30	76,072	24, 489	13, 376	2,759	980	5, 602	123, 278
1	76,942	25, 971	27, 161	9, 455	2, 547	932	143, 008
[	2, 405	10, 548	6, 548	7,764	1,395	4, 403	33, 063
	11, 331	31, 170	9, 692	5, 587	2,147 5,478	2,414	62, 321
		33, 789	14,652	9, 169	0,4/8	5,508	73, 844
)	4, 840	20, 261	4,206	1,894	1, 258 509	880 307	32, 839
l winter.	7, 496	28,660	4,062	1, 464	000	801	42, 498
winter. 27	201, 893	145, 602	31, 067	10,084	7,821	10, 978	407, 445
28	100, 264	123, 475	41, 434	10, 331	11, 127	14,664	310, 295
		168, 205	69, 541	19, 331 28, 330	18,914	16, 836	442, 871
	99, 115	202,095	110, 726	34,014	11, 495	13, 022	470, 467
	209, 130	170, 336	45, 361	19,505	10,586	7, 003	461, 921
nte:.	200, 200	2.0,000	20,002	20,000	19,000	.,, 555	202, 022
	35, 810	40, 147	11,656	7,903	2,881	6,011	104, 408
	10, 563	25, 795	13, 659	7,942	2,305	3, 371	63, 635
	8, 317	15, 856	7, 416	4,924	1,654	3, 967	42 134
	4,933	25, 803	19, 668	4,107	970	1,709	42, 134 57, 190
L	35, 847	12,637	2, 427	610	392	395	52, 308
27	10,981	25, 696	8, 215 8, 733	1,999	423	659	47, 973
8	17,822	25, 819	8, 733	3,072	1,870	3, 492	60, 308
9	17,412	19,438	2,791	650	228	322	40, 841
9	13, 098 11, 786	22, 785 26, 113	3, 667	481 568	131	346	40, 508
il	11, 180	20,113	5, 122	908	130	207	43, 926
27	15,877	20, 626	10.011	7,340	2,597	6,022	00 477
28	14,807	99 89/	12,042	5, 570	2,453	3, 097	62, 473 60, 593
9	14, 150	22, 624 23, 338	13, 111	8, 395	5, 621	4, 533	69, 148
30	11, 187	20, 687	11, 454	3,914	2,076	1, 927	51, 245
1	22, 092	23, 589	8, 540	4,582	1,790	1,050	61, 643
V4	, 002	20,000	0,010	4,000	2,.00	1,000	01, 030
27	318, 126	271, 992	91, 320	52,767	19, 231	38, 779	792, 215
28	261, 072	271, 992 285, 722	126, 828	60, 245	25, 602	38, 977	798, 446
-29	296,774	297, 612	130, 073	59, 930	36, 520	71, 978	892, 887
0	208, 745	316, 120	163, 097	47, 169	16,910	23, 486	775, 527
	363, 293	287, 306	92, 673	36, 184	15,954	9, 894	805, 304

Bureau of Agricultural Economics. Compiled from reports of licensed inspectors through district offices of Federal grain inspection. See 1927 Yearbook, p. 752, for data for earlier years. The quantity loaded per car varies, but car-lot receipts have been converted to bushels by using a factor of 1,300 bushels to a car.

Table 14.—Wheat: Visible supply in the United States, 1922-23 to 1931-32

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Мау	June
1922-23. 1923-24. 1924-25. 1925-26. 1925-27. 1927-28. 1928-29. 1929-30. 1930-31. 1931-32.	20, 342 29, 403 38, 597 29, 285 16, 486 25, 516 42, 208 95, 684 112, 755	23, 077 40, 526 46, 193 34, 041 34, 575 37, 533 66, 762 145, 504	32, 479 63, 922 79, 700 89, 800 72, 884 71, 908 96, 798 196, 886 201, 541	bushels 38, 025 72, 930 92, 353 56, 639 84, 724 88, 755 118, 327 206, 778 219, 108	bushels 39, 023 79, 084 100, 712 52, 394 81, 175 96, 676 143, 003 209, 426 211, 600	39, 764 82, 269 108, 997 52, 686 78, 910 100, 013 145, 234 198, 557 207, 479	bushels 43, 856 84, 030 99, 121 50, 244 70, 811 94, 336 146, 813 188, 171 200, 007	bushels 53, 823 75, 111 84, 476 52, 730 62, 317 83, 720 133, 759 173, 483	54, 562 72, 914 76, 437 48, 105 61, 271 77, 949 130, 034 165, 174	51, 862 66, 739 62, 766 38, 173 53, 827 73, 220 128, 339	49, 521 50, 383 49, 529 33, 798 42, 402 66, 184 116, 559	48, 686 88, 328 23, 170 31, 115

Bureau of Agricultural Economics. Compiled from Bradstreet's. Includes grain stored at approximately 50 interior and seaboard points of socumulation and grain in transit by causis and lakes; also Pacific coast stocks at Portland, Tacoma, and Scattle.

I Saturday nearest the 1st of each month.

Table 15.—Wheat: Commercial stocks in store, 1926-27 to 1931-32 DOMESTIC WHEAT IN UNITED STATES 1

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Мау	June
1926-27 1927-28 1928-29 1929-30 1930-31 1931-32	38, 587 90, 442	33, 677 52, 421 136, 423 161, 897	62, 042 93, 870 186, 847 201, 319	78, 811 115, 469 198, 211 223, 826	89, 684 139, 493 202, 461 211, 381	91, 589 140, 172 189, 926 206, 618	66, 340 88, 381 144, 351 185, 151 199, 649	56, 303 79, 152 129, 646 168, 346	56, 262 72, 858 126, 377 160, 674	49, 910 68, 791 124, 756 153, 122	37, 667 61, 957 113, 392 135, 470	97 999

### UNITED STATES WHEAT IN CANADA

1926-27 1927-28 1928-29 1929-30 1930-81	1, 362 2, 506 3, 332 4, 729 14, 657	2, 288	4, 560 3, 295 8, 770 4, 699 32, 511	9, 065 4, 756	5, 156 8, 280 9, 101 4, 790 29, 414	1, 067 3, 933 7, 328 8, 546 4, 819	549 2, 285 3, 930 7, 517 4, 802	437 1, 680 2, 139 6, 613 4, 951	378 977 1, 586 5, 860 4, 891	746 863 1, 738 5, 431 5, 897	1, 344 2, 314 4, 865 4, 359 7, 851
	•	i i			· 1						

#### CANADIAN WHEAT IN UNITED STATES:

1926-27 1927-28 1928-29 1929-30 1930-31	16, 435	13, 605 23, 550 16, 468	12,603	17, 304	22, 112	80, 297	35, 764 46, 717 38, 837 32, 266	28, 703 38, 327 35, 517 26, 954	19, 260 32, 851 31, 516	11, 848 23, 854 25, 285	10, 724 6, 597 28, 772 17, 587 2, 766	16, 749 11, 549 25, 538 14, 372 5, 926
1931–32	5, 409	6, 244	6, 227	9, 116	12, 596	23, 480						

Bureau of Agricultural Economics. Compiled from weekly reports to the grain, hay, and feed market news service. Data are for stocks on the Saturday nearest the 1st day of the month.

1 Includes wheat in store in public and private elevators in 42 important markets and also the wheat afloat in vessels or barges in the harbors of lake and seaboard ports. Wheat in transit either by rail or water, mill stocks, or small private stocks of wheat intended only for local purposes, not included.

2 Includes wheat stored at lake and seaboard ports, exclusive of wheat in transit on lakes and canals.

Table 16.—Wheat: Production and farm disposition, price per bushel, farm value, gross income, and cash income, United States, 1924-1930

Year	Produc- tion	Used for seed	Fed to live- stock	Loss, waste, and shrink- age	Ground at mills for home use or ex-changed for flour	Sold or for sale	Farm price,¹ per bushel	Farm value	Gross income	Cash income
1924	1,000 bushels 864, 428 676, 765 831, 381 878, 374 914, 876 809, 176 850, 965	1,000 bushels 80, 635 78, 895 84, 062 90, 383 83, 582 82, 384 77, 198	1,000 bushels 49,649 28,919 36,017 42,126 53,323 55,429 156,972	1,000 bushels 7, 103 5, 729 6, 667 6, 666 6, 524 7, 252	1,000 bushels 9,965 9,935 10,185 10,030 8,425 9,215 9,860	1,000 bushels 717,076 553,287 694,450 729,168 762,980 655,624 599,683	Dollars 1, 25 1, 43 1, 22 1, 18 , 99 1, 05 , 86	1,000 dollars 1,083,009 972,141 1,014,420 1,045,858 914,906 849,541 566,231	1,000 dollars 907, 460 807, 709 858, 977 876, 891 764, 890 696, 207 401, 441	1,000 dollars 893, 403 792, 141 845, 687 863, 597 754, 121 685, 323 393, 224

Bureau of Agricultural Economics. Estimate prepared April, 1931; not revised to December, 1931, revised estimates of production.

<sup>&</sup>lt;sup>1</sup> Based on monthly prices weighted by estimated monthly marketing by States which differ from weighted prices in Table 21, in which production weights are used.

<sup>2</sup> Preliminary.

<sup>100446°-32--38</sup> 

Table 17.—Wheat, including flour: Supply, distribution, and disappearance in continental United States, averages 1899-1900 to 1925-26, annual 1927-28 to 1931-32

				¥	ear begin	ning July			
Item	1900 to	Aver- age 1909–10 to 1913–14	to	age 1921–22 to		1928–29	1929-30	1930-31	1931–32
SUPPLY		1 000	4.000	1 000	1.000	1 000	4 000	4 000	
Stocks, July 1: On farms <sup>1</sup> In country elevators and	46, 423	bushels 28, 872	32, 631	bushels 37,059	27, 222	1,000 bushels 23,729	1,000 bushels 45,483	1,000 bushels 47,417	1.000 bushels 31,865
mills 1 Commercial stocks 2 In merchant mills and	27, 000 31, 817	29, 000 24, 168	26, 997 19, 290			19, 277 38, 587	41, 546 90, 442		30, 552 203, 967
elevators 3In transit to merchant					37, 038	31, 920	48, 279	46, 670	21, 808
mills 3 Stored for others by mer-					11, 274	10, 893	16, 237		12, 198
chant mills 3						*********			18, 413
Total wheat as grain Flour (in terms of wheat) 4	108, 240 7, 709	82,040 8,805	78, 918 8, 606	93, 569 8, 676	118, 362 9, 076	124, 406 9, 019		290, 786 20, 497	318, 803 6, 886
Total wheat and flour _ New crop <sup>1</sup> Imports (flour inluded) <sup>5</sup>	112, 949 677, 927 753	90, 345 690, 108 1, 834	87, 524 844, 605 19, 806	102, 245 804, 218 17, 478	27, 438 878, 374 15, 734	133, 425 914, 876 21, 442	812, 573	858, 160	325, 689 892, 271
Total supply	791, 629	782, 287	951, 935	923, 936	1, 021, 546	1, 069, 743	1, 081, 057	1, 188, 502	
DISTRIBUTION									
Exports and shipments:  Exports (flour included) <sup>3</sup> Recxports (flour included) <sup>4</sup>	156, <del>4</del> 35	1				163, 687 55			
Shipments (flour included to Alaska, Hawaii, and Porto Rico) 3	2,034	2,549	2, 546	2, 836	2, 690	8, 172	2, 977	2, 850	
Total Seed requirements f Disappearance for food, feed,		109, 847 72, 326				166, 914 83, 582	156, 294 82, 965	134, 406 77, 198	
and waste Carry-over, June 30 7	462, 221 100, 096	501,768 98,846	514, 354 89, 131	534, 040 97, 431	588, 736 133, 425	563, 719 255, 528		651, 209 325, 689	
Total distribution	791, 629	782, 287	951, 935	923, 936	1, 021, 546	1, 069, 743	1, 081, 057	1, 188, 502	
Population, Jan. 1 8	Thou- sands 82, 614	Thou- sands 94,378	sands	sands	Thou- sands 119,029	Thou- sands 120, 694	Thou- sands 122, 359	Thou- sands 124,000	Thou- sands
Per capita disappearance: For food, feed, and waste For food, feed, seed, and	Bush- els 5. 595	Bush- els 5.317	els 5, 000	els 4. 739	Bush- els 4.946	Bush- els 4. 671	Bush- els 4.438	Bush- els 5. 252	Bush- els
waste	6. 448	6.083	5. 858	5. 468	5. 705	5. 363	5. 116	5, 874	

Bureau of Agricultural Economics. Compiled as follows:

1 Based on returns to the bureau from crop reporters.

2 From Bradstreet's visible supply 1899-1900 to 1925-28. Bureau of Agricultural Economics, 1927-28 to 1931-32.

3 Bureau of the Census figures raised to represent all merchant mills.

4 From Chicago Daily Trade Bulletin.

5 From reports of Foreign and Domestic Commerce of the United States.

6 Amount of seed made agrangement returns to the bureau from inquiries sent to grop reporters.

Amount of seed used per scre from returns to the bureau from inquiries sent to crop reporters.

For individual items see above.

Bureau of the Census.

Table 18.—Wheat: Production, 1923-24 to 1931-32, exports, and weighted average price per bushel of representative grades by classes, 1925-24 to 1930-31

				Estima	ted produ	ction i			
Year beginning July	Hard red spirng	Durum	Hard red winter	Soft red winter	White 2	Mixed 3	Floures wheat	Other wheat	Total
1923-24 1924-26 1925-26 1926-27 1927-28 1928-29 1928-30 1930-31 1931-32	192, 341 156, 053 121, 078 201, 927 203, 071 144, 821	1,000 bushels 55, 269 66, 105 65, 008 47, 575 83, 162 102, 286 59, 297 66, 979 22, 873	1,000 bushels 241, 851 364, 662 206, 135 360, 440 317, 042 384, 014 374, 572 388, 974 500, 776	1,000 bushels 271, 631 189, 441 169, 792 228, 886 180, 887 139, 665 163, 407 173, 101 245, 915	1,000 bushels 101, 767 51, 879 79, 777 78, 402 95, 356 85, 840 70, 476 75, 148 60, 813		1,000 bushels		1,000 bushels 797, 394 864, 428 676, 765 831, 381 878, 374 914, 876 812, 573 858, 160 892, 271
		Inspecti	ons for ex	port and o	other expo	orts of do	nestic wh	eat and fl	our 4
1923-24 1924-25 1925-26 1928-27 1928-27 1927-28 1928-29 1929-30 1930-31	3, 338 1, 829 5, 209 1, 766	4, 908 5, 945 4, 170 611 3, 496 1, 045 360 712	19, 640 90, 840 7, 358 66, 874 41, 603 30, 660 49, 290 44, 328	9, 810 6, 944 2, 282 29, 980 9, 915 2, 782 2, 547 2, 495	18, 653 10, 063 16, 914 26, 615 28, 150 14, 710 17, 527 13, 292	5, 435 9, 386 5, 944 1, 398 1, 874 1, 473 751 192	81, 087 65, 313 44, 846 62, 910 60, 260 60, 574 61, 070 55, 259	19, 325 55, 552 23, 183 28, 943 55, 752 50, 677 20, 210 14, 796	159, 880 260, 803 108, 035 219, 160 206, 259 163, 687 153, 245 131, 536
				Average	price per	bushel•			
1923-24	165 151 141 126	Cents 108 158 144 155 132 113 119 78	Cents 105 135 163 135 135 136 112 120 76	Cents 107 159 169 138 149 139 130 83					

Bureau of Agricultural Economics. Estimated production by classes based on questionnaire surveys of local authorities; supplemented by judgment of cereal specialists. Inspections of United States wheat for export data furnished monthly by Federal grain supervision officers at the export markets. Inspections are made at the ports of export. Export figures from reports of the Bureau of Foreign and Domestic Com-

<sup>1</sup> Production estimates are based on the estimate of percentage classification by States as reported for 1920-21, 1923-24, and 1924-25; the percentages for 1921-22 and 1922-23 were interpolated from the 1920-21 and 1923-24 percentages. The estimated production for 1930-31 and 1931-32 is subject to revision.

2 White wheat in the Pacific Northwest region consists of both spring and winter wheat; mattempt has been made to elassify this wheat as other than white wheat, part of which is spring and part winter.

3 Mined wheats exported from Atlantic coast ports are estimated as approximately 70 per cent durum and the remainder as hard red spring; that exported from Gulf ports as approximately half and half hard and soft winter; and that exported from Pacific coast ports as approximately 90 per cent white and the remainder as hard and soft red winter wheats.

4 Designations by classes include all inspections for export. Flour as wheat is as reported by customs offices. "Other wheat" comprises total domestic exports as reported by customs offices minus "inspections for export" and consists principally of exports through Canada from customs districts of Buffalo, Chicago, Duluth-Superior, Ohio, and Wisconsin.

3 The representative grades and markets selected are No. 1 Dark Northern Spring, Minneapolis; No. 2 amber durum, Minneapolis; No. 2 hard winter, Kansas City; and No. 2 red winter, St. Louis.

Table 19.—Wheat including flour, in terms of grain: International trade, average 1925-26 to 1929-30, annual 1927-28 to 1930-31

				7	ear begi	nning Ju	ly 			
Country	1925-	rage -26 to 9-30	192	7-28	192	s-29	1929	9–30	1930	-31 1
	Ex- ports	Im- ports	E\- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports
PRINCIPAL EXPORTING COUNTRIES  Canada	1,000 bushels 307, 640 170, 077 169, 377 83, 268 22, 539 \$20, 319 10, 822 10, 080 6, 528 5, 162 1, 869	1,000 bushels 796 15,815 2 10 3 8 0 5 8,636 79 2 2,104 5 1804	1,000 bushels 305,658 206,259 168,214 72,962 22,135 4,866 1,024 15,668 8,067 6,351 6,29 2,125		1,000 bushels 422,732 163, 687 227, 059 107, 785 23, 658 124 7,919 5,716 41,583 5,904 5,431 7,60	1,000 bushels 1,331 21,442 	1,000 bushels 184, 213 153, 245 161, 265 61, 776 31, 415 -23, 593 6, 798 4 2, 561 5, 363 6, 120 96	1,000 bushels 1,392 12,956 3 3 0 0 8,646 4 66	1,000 bushels 267, 365 131, 536 120, 510 143, 295 18, 425 44, 930 10, 197 414, 793 6, 286 5, 041	1,000 bushels 243 19,059
Chile		456	585 814, 543	622 21,884	757 973, 115	116 53, 835	1, 063 637, 508	25, 088	1, 193 723, 571	30, 831
PRINCIPAL IMPORT-										
United Kingdom Germany Italy France Belgium Brazil Netherlands China 6 Japan Greece Czechoslovakia Irish Free State Switzerland Austria Egypt Denmark Sweden Norway Union of South	0 116 162 524 2,004	215, 665 85, 668 76, 212 46, 574 43, 482 32, 839 30, 050 23, 486 23, 158 18, 604 18, 502 16, 461 16, 275 10, 481 10, 102 9, 092 6, 964	11, 181 6, 784 1, 103 2, 618 0 586 1, 464 4, 859 0 41 56 0 165 433 220 1, 660	222, 270 98, 557 87, 905 53, 877 44, 848 84, 653 15, 464 21, 916 21, 823 18, 601 118, 427 10, 230 6, 752 10, 391 6, 862	17, 664 2, 184 116 2, 542 0 709 4, 205 10, 768 0 50 110 0 59 181 110 3, 076	215, 138 86, 162 91, 936 50, 665 54, 061 86, 244 22, 518 20, 328 22, 203 22, 144 17, 248 17, 853 14, 903 12, 906 17, 149 10, 553 8, 588	10, 795 7, 203 3, 273 18, 055 2, 018 0 856 1, 865 5, 403 0 1, 694 1 132 108 310 2, 068	212, 698 67, 958 46, 700 38, 471 44, 541 33, 890 19, 153 19, 156 21, 521 13, 980 17, 915 18, 530 11, 202 8, 080 9, 355 7, 130	10, 064 825 2, 628 22, 128 3, 110 0 1, 428 59 7, 953 0 1, 751 4 267 24 112 72	230, 900 30, 853 86, 225 66, 943 48, 244 30, 789 22, 021 25, 343 24, 081 17, 063 18, 393 15, 666 9, 702 11, 523 5, 509 8, 274
Africa Cuba Finland Spain Poland Syria and Lebanon 4 Latvin 4 New Zealand Indo-China 4 Estonia		6, 317 5, 685 5, 390 5, 189 4, 820 2, 710 2, 027 1, 658 1, 177 1, 062	223 0 408 225 15 0 1 0	8, 215 5, 740 5, 499 2, 220 7, 840 1, 853 1, 507 1, 032 1, 233 1, 062	261 0 0 366 106 7 0 4 0	8, 148 5, 531 6, 095 17, 244 8, 865 5, 358 2, 861 792 1, 206 1, 176	327 0 0 188 790 22 0 217 0	5, 036 5, 623 4, 959 602 1, 304 2, 520 719 1, 211 1, 218	173 0 0 4, 286 290 0 1 0 0	3, 631 4, 878 280 458 1, 944 752 1, 008
Total	45, 869	739, 672	32, 177	775, 785	53, 742	791, 315	55, 325	691, 348	55, 175	721, 121

Bureau of Agricultural Economics, official sources except where otherwise noted. Fureau of Agricultural Scottonics, outside the Preliminary.

3-year average.
4-year average.
4 Monthly Crop Report and Agricultural Statistics.
1 year only.
Calendar year.

Table 20.—Wheat, all: Estimated average price per bushel received by producers, United States, 1922-23 to 1931-32

Сгор усаг	July 15	Aug. 15	Sept.	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	Weight- ed aver- age
1922-23 1923-24 1924-25 1925-26 1925-26 1926-27 1927-28 1928-20 1929-30 1930-31	Cts. 99. 8 89. 6 105. 8 140. 3 127. 7 127. 3 118 1 102 4 70 6 36. 3	86, 4 116, 8 150, 4 125, 1 123, 5 95, 2 110, 7	91. 0 114. 2 144. 4 117. 7 119. 2 94. 4 112. 1 70. 3	94. 2 129. 7 136. 4 121. 4 113. 7 98. 7 111. 5 65. 6	93. 7 133. 6 148. 8 123. 6 111. 4 97. 1 103. 4	94. 5 111. 1 153. 7 122. 8 113. 9 98. 2 108. 1 61. 3	96. 7 162. 1 158. 1 122. 2 115. 2 98. 5 107. 5	104. 4 98. 0 169. 8 155. 5 122 8 116 2 104. 2 101 3	98. 8 164. 0 116 0 120 9 121. 6 104. 7	108 4 95 8 140 5 142 2 117 2 129 2 99 8 93 4	149, 1 142, 1 123, 2 144, 3 90, 1 87, 5	100, 8 98, 5 152, 7 138, 9 130, 1 132, 0 86, 8 87, 9	127. 8 145 9 123. 8 120. 5 100. 1 105. 1

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by monthly marketings. Mean of prices reported on 1st of month and 1st of succeeding month, July, 1922–December, 1923.

Table 21.—Wheat: Weighted average price 1 per bushel of reported cash sales at Minneapolis and St. Louis, 1922-23 to 1931-32

Grade, market, and crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feh.	Mar.	Apr.	Nay	June	Weight- ed aver- age
No. 1 northern spring, Minne-apolis: 1922-23	Cents 149 112 137 159 172 147 138 143 92 61	Cents 111 118 131 164 149 143 119 135 91 65	Cents 110 121 130 150 143 134 119 135 87 69	Cents 115 120 146 149 129 116 131 82 71	Cents 123 114 148 155 146 130 116 128 75 80	Cents 125 116 166 169 146 132 115 131 77	Cents 123 119 189 173 143 135 121 127 76	Cents 126 121 187 167 142 134 128 125 75	Cents 124 121 171 161 139 139 125 112 76	Cents 130 121 150 164 138 153 120 111 79	Cents 129 122 167 162 147 157 111 107 81	Cents 117 125 164 163 149 148 115 100 74	Cents 120 117 156 161 146 136 118 133 83
1922-23 1922-24 1924-25 1925-28 1926-27 1927-28 1928-29 1929-30 1930-31 1931-32 No. 2 amber durum, Minneapolis:	112 97 135 159 142 141 147 139 85 48	109 99 138 172 134 142 138 132 89 47	114 109 140 171 136 142 145 135 88 47	123 116 156 170 140 145 144 132 87 52	129 112 163 171 136 141 145 129 83 62	136 114 179 184 137 144 139 135 83 57	137 116 210 194 138 151 142 134 78	139 118 202 185 135 156 140 123 79	136 114 186 170 130 169 135 118 78	139 113 177 171 129 196 125 117 80	188 112 186 162 142 196 117 114 79	123 116 189 147 150 179 121 105 72	121 107 159 169 138 149 139 130 83
1922-23 1922-24 1924-25 1925-28 1926-27 1927-28 1928-29 1929-30 1930-31 1931-32	122 96 127 164 154 153 123 135 87 61	102 96 129 150 153 140 108 127 86 73	98 99 129 130 138 128 106 128 79 73	101 104 161 129 150 123 112 125 78 79	111 103 164 143 161 128 114 119 70 87	110 104 176 156 174 133 110 123 74 84	108 113 215 157 168 130 127 119 72	107 115 210 151 160 129 129 111 73	111 118 202 144 157 133 124 97 72	117 114 176 149 154 141 118 99 73	112 115 180 147 158 140 108 97 77	104 118 162 150 157 131 115 88 64	107 106 156 144 155 132 113 119 78

Bureau of Agricultural Economics. Compiled from Minneapolis Daily Market Record and St. Louis Daily Market Reporter.

Average of daily prices weighted by car-lot sales.

Table 22.—Wheat: Weighted average price 1 per bushel of reported cash sales of all classes and grades, six markets combined, 1922-23 to 1931-32

Стор уеаг	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Juno	Weight- ed aver- age
1922-23 1923-24 1924-25 1924-25 1925-20 1926-27 1927-28 1928-29 1929-30 1930-31 1931-32	Cents 116.1 99.0 125.7 155.7 141.6 138.7 126.0 129.8 82.6 46.5	105. 9 101. 8 123. 5 160. 5 135. 8 136. 4 109. 4 125. 7	102.7 106.8 128.3 144.8 135.6 128.7 108.9 127.4 79.0	108.8 110.4 144.8 143.3 139.4 125.1 107.0 123.7	153. 5 137. 7 125. 6 109. 1 121. 2 69. 8	117. 8 105. 0 163. 6 165. 7 139. 5 128. 0 107. 4 123. 5	115. 6 110. 3 188. 8 170. 3 138. 8 131. 0 113. 7 121. 6	116. 1 111. 8 184. 8 164. 8 136. 2 132. 0 118. 1 115. 8	117. 0 111. 6 172. 1 154. 9 133. 6 136. 6 114. 2 103. 9	122. 0 109. 9 150. 8 156. 0 134. 7 150. 7 109. 2 102. 5	117. 9 110. 5 165. 5 153. 8 145. 1 151. 4 101. 1 100. 9	109. 5 116. 6 161. 6 151. 6 148. 6 141. 8 105. 3 94. 1	145. 3 155. 0 138. 3

Bureau of Agricultural Economics. Compiled from daily trade papers of markets named. The markets are Chicago, Minneapolis, Kansas City, st. Louis, Omaha, and Duluth.

Table 23.—Wheat, No. 2 hard winter: Weighted average price 1 per bushel of reported cash sales at Kansas City, 1899-1900 to 1931-32

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Weight- ed aver- age
	Cents												
1899-1900	66	65	65	65	63	64	63	64	64	64	62	66	65
1900-012	69	66	67	68	67	66	68	68	69	70	70	67	68
1901-022	63	67	66	66	69	75	79	75	72	72	74	70	68 68 68 77
1902-03	70	66	67	67	67	67	67	68	68	68	69	73	68
1903-04	70	73	73	73	72	71	75	87	89	89	92	89	77
1904-05	87	94	103	106	105	105	107	109	104	93	101	100	97
1905-06	84	80	78	80	81	81	81	78	76	79	80	78	80
1906-07	71	68	66	69	69	70	71	72	71	73	90	91	72
1907-08	87	86	93	100	96	97	100	95	98	97	100	97	93
1908-09	97	95	98	99	102	103	106	110	115	130	138	137	99
1909-10	114	102	102	106	104	110	111	111	110	108	107	108	107
1910-11	104	100	99	95	91	93	95	90	88	88	90	88	98
1911-12	87	93	95	104	100	100	105	103	105	109	111	109	97
1912-13	92	89	88	88	83	84	87	86	86	88	87	88	88
1913-14	82	83	87	84	83	84	85	86	88	87	90	85	84
1914-15	78	91	104	102	108	113	134	154	149	154	150	121	105
1915-16	136	126	107	107	103	112	120	120	105	112	110	100	119
1916-17	114	141	157	167	185	172	189	182	197	243	301	274	171
1917-18	268	261	212	212	212	212	212	212	212	212	212		
1918-19	220	216	216	216	215	224	231	226	239	262	260	247	219
1919-20	225	218	224	230	246	263	282	242	249	275	293	276	242
1920-21	268	245	244	207	176	169	172	162	155	133	147	138	183
1921-22	118	115	123	110	109	109	113	129	134	135	134	117	120
1922-23	113	104	104	118	117	117	114	115	116	120	116	104	113
1923-24	_96	101	109	112	109	109	113	111	109	104	106	108	105
1924-25	120	119	120	137	143	162	182	181	171	151	163	160	135
1925-26	154	164	158	158	163	172	178	171	161	159	155	153	163
1926-27	137	131	132	139	137	138	137	135	133	131	142	144	135
1927-28	136	135	131	128	131	132	133	133	138	152	160	147	135
1928-29	120	106	107	110	112	111	114	118	116	110	101	105	112
1929-30	125	123	124	122	119	121	119	113	102	101	99	89	120
1930-31	80	81	78	74	69	71	69	69	70	93	73	68	76
1931-32	44	43	43	48	59	52				l			

Bureau of Agricultural Economics. Compiled from Kansas City Grain Market Review, formerly Daily Price Current.

<sup>&</sup>lt;sup>1</sup>Average of daily prices weighted by car-lot sales. The prices in this table are comparable with prices paid to producers, in that the latter are averages of the several prices reported which cover all classes and grades sold by producers.

<sup>&</sup>lt;sup>1</sup>Average of daily prices weighted by car-lot sales. <sup>2</sup>Calendar year 1901, compiled from Kansas City Daily Star.

Table 24.—Wheat, No. 3 Manitoba Northern: Average cash price per bushel at Winnipeg, in terms of United States money, 1921-22 to 1931-32 1

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Мау	June	Aver- age
1921-22	Cents 156 120 99 126 153 149 153 120 152 90 49	Cents 150 107 103 134 160 138 145 108 152 88 46	Cents 125 95 96 136 132 133 131 106 144 43	Cents 100 96 89 150 120 136 127 111 134 68 45	Cents 93 105 87 153 136 131 124 111 126 60 52	Cenis 94 104 83 161 149 123 124 109 130 48	Cents 95 103 86 184 146 123 112 112 123 47	Cents 118 105 90 187 144 127 124 120 110 53	Cents 124 105 88 167 130 131 119 100 50	Cents 126 113 89 149 146 133 141 115 103 54	Cents 130 111 92 174 144 146 112 107 104 53	Cents 117 108 105 162 144 149 130 112 98 53	Cents 119 106 92 157 143 135 133 113 62

Bureau of Agricultural Economics. Compiled as follows: July, 1921–July, 1928, Reports on the Grain Trade of Canada; August, 1928, to latest date shown, Munneapolis Daily Market Record. Conversions at current rate of exchange July, 1921–March, 1925, and September, 1931, to end of table; par rate used April, 1925–August, 1931. Rates are monthly averages as reported by the Federal Reserve Board.

Table 25.—Wheat: Average spot price per bushel of imported wheat at Liverpool, 1914-15 to 1931-32

#### IMPORTED RED

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Мау	June	Aver-
1914-15	Cents 103 158 250 232 229 234 1171 152 138 143 176												Cents 157 175 224 235 240 215 223 151 144
		l	l	]	PARC	ELS		l	I	L	<u></u>	<u> </u>	<u></u>
1925-26. 1926-27. 1927-28. 1928-29. 1929-30. 1930-31. 1931-32.	169 167 161 141 141 106 62	173 162 160 126 142 105 53	160 160 151 126 137 92 53	149 171 149 129 136 86 59	165 171 147 129 125 81 64	185 163 148 126 141 74 57	181 160 149 131 140 68	175 157 146 135 124 70	161 155 151 131 119 67	171 156 159 125 120 71	173 165 155 116 114 72	169 165 147 117 110 67	169 163 152 128 129 80

Bureau of Agricultural Economics. Price per bushel of 60 pounds, good average imported red, July, 1914-June, 1926, compiled from Broomhall's 1921, 1925, and 1927 Corn Trade Yearbooks. Parcels price per bushel of 60 pounds July, 1925, to date, compiled from Broomhall's Corn Trade News. These prices are simple averages of daily sales prices of parcels at Liverpool. Conversions at par from January, 1926, to August, 1931, inclusive. Prior to January 1928, and beginning with September, 1931, conversions were made at monthly average of current rates of exchange as given in Federal Reserve Bulletins.

<sup>1</sup> Average of daily cash closing prices, basis, in store at Fort William and Port Arthur.

<sup>1</sup> No. 2 hard winter when available, otherwise No. 2 red winter.

<sup>\*</sup> No quotations.

Table 26.—Flour, wheat, spring patents: Average wholesale price per barrel, Minneapolis, 1922-23 to 1931-32

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Aver- age
1922-23	Dolls 7, 95 6, 21 7, 72 8, 78 9, 27 8, 26 7, 92 8, 57 6, 12 4, 76	6. 37 7. 69 9. 04 8. 50 7. 98 7. 20 8. 10 5. 94	6. 68 6. 45 7. 52 8. 52 7. 87 7. 52 7. 16 7. 94 5. 67	6. 76 6. 43 8. 19 8. 52 8. 08 7. 43 6. 89	6. 88 6. 21 8. 22 8. 81 7. 85 7. 38 6. 79 7. 44 5. 18	6. 86 6. 30 9. 03 9. 52 8. 02 7. 37 6. 64 7. 69 5. 30	6. 71 6. 44 9. 80 9. 85 7. 95 7. 48 6. 84 7. 44 5. 37	6. 72 6. 51 10. 02 9. 46 7. 85 7. 47 7. 27 7. 06	6. 72 6. 49 9. 34 9. 19 7. 74 7. 88 7. 29 6. 86	7. 00 6. 56 8. 54 9. 20 7. 75 8. 48 7. 22	6. 80 6. 83 9. 12 9. 00 8. 23 8. 68 6. 82 6. 58	7. 12 8. 86 9. 32 8. 39 8. 36 6. 94 6. 47	6. 89 6. 49 8. 67 9. 10 8. 12 7. 86

Bureau of Agricultural Economics. Compiled from the Minneapolis Daily Market Record. Prices 1909-1921, appear in 1930 yearbook, Table 25.

Table 27.—Bread: Average retail price per pound (baked weight) in leading cities of the United States, 1922-23 to 1931-32

Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Aver-
	15	15	15	15	15	15	15	15	15	15	15	15	age
1922-23 1923-24 1924-25 1925-26 1926-27 1927-28 1928-29 1928-29 1928-30 1930-31 1931-32	Cents 8.8 8.8 9.4 9.3 9.2 9.0 8.8 7.5	Cents 8.7 8.8 9.4 9.3 9.3 9.7 7.4	Cents 8.7 8.7 8.8 9.4 9.3 9.1 9.0 8.7 7.3	Cents 8.7 8.8 9.4 9.3 9.1 8.9 7.3	Cents 8.7 8.9 9.4 9.3 9.1 8.9 8.5 7.3	Cents 8.6 8.7 8.9 9.4 9.2 9.0 8.9 8.5 7.2	Cents 8.7 8.7 9.2 9.4 9.2 9.0 8.9 8.2	Cents 8.7 8.7 9.5 9.4 9.2 9.0 8.8 8.0	Cents 8.7 8.7 9.4 9.4 9.1 9.0 8.8 7.9	Cents 8.7 8.7 9.4 9.4 9.1 9.0 8.8 7.7	Cents 8.7 8.7 9.4 9.4 9.1 9.0 8.8 7.7	Cents 8.7 8.7 9.4 9.3 9.2 9.0 8.8 7.6	Cents 8, 7 8, 7 9, 1 9, 4 9, 2 9, 1 8, 9 8, 2

Bureau of Agricultural Economics. Compiled from Bureau of Labor Statistics retail prices, monthly Data for 1913-14 to 1921-22 are available in the 1930 Yearbook, p. 615, Table 26.

Table 28.—Bran, standard: Average wholesale price per ton in 100-pound sacks, Minneapolis, 1922-23 to 1931-32

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Мау	June	Aver- age
1922-23 1923-24 1924-25 1925-26 1926-27 1928-29 1928-29 1929-30 1930-31	Dolle. 15. 31 19. 84 22. 27 23. 58 22. 02 25. 13 27. 29 26. 17 19. 33 10. 30	28. 62 28. 43 24. 20 21. 69 26. 85 24. 12 26. 44 24. 17	16. 88 27. 79 23. 00 23. 09 21. 64 25. 88 25. 49 29. 19 21. 43	28. 07 24. 66 22. 83 21. 33 25. 96 28. 09 28. 21 19. 91	25. 65 25. 62 25. 73 23. 14 28. 41 20. 82 27. 90 17. 97	24, 77 30, 43 26, 34 26, 02 30, 09 31, 69 27, 66 16, 57	24. 98 30. 14 26. 17 26. 48 30. 66 30. 54 26. 58 15. 61	23. 66 24. 49 23. 68 27. 64 32. 47 28. 64 24. 45	22, 00 23, 45 22, 24 26, 96 35, 68 26, 88 23, 17	20. 84 23. 46 25. 05 27. 31 34. 28	17. 66 26. 84 23. 30 28. 43 35. 03 22. 38 25. 06	19, 12 26, 34 21, 31 26, 51 29, 68 22, 50 21, 25	22. 64 23. 17 25. 34 23. 96 24. 93 30. 01 26. 79 26. 13

Bureau of Agricultural Economics. Compiled from the Minneapolis Daily Market Record. Prices are simple averages of daily quotations.

<sup>1</sup> Packed in 99-pound cotton sacks.

Table 29.—Middlings, standard: Average wholesale price per ton, in 100-pound sacks, Minneapolis, 1922-23 to 1931-32

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.   May	June	Aver- age
1922-23 1923-24 1924-25 1925-26 1926-27 1927-28 1928-29 1929-30 1930-31 1931-32	Dolls. 17, 30 24, 83 24, 46 25, 53 22, 96 31, 42 32, 18 28, 42 20, 64 11, 06	Dolls. 16. 24 25. 89 25. 68 26. 95 23. 01 34. 46 24. 31 29. 25 25. 10 10. 35	Dolls. 18. 03 27. 85 25. 27 26. 37 22. 67 29. 22 27. 44 32. 66 22. 17 10. 35	Dolls. 13.06 27.78 26.64 24.19 22.31 26.88 28.61 32.08 19.55 10.02	Dolls. 23. 23 25. 13 27. 99 26. 31 24. 16 28. 72 31. 01 28. 76 17. 49 14. 40	Dolls. 23. 73 23. 80 31. 44 25. 28 27. 38 30. 00 31. 21 28. 00 16. 00 13. 03	Dolls. 25, 81 25, 43 33, 08 26, 10 27, 35 30, 52 30, 46 28, 46 14, 85	Dol's. 27. 26 23. 95 26. 09 23. 71 28. 61 32 71 28. 31 24. 11 13. 52	Dolls. 28. 11 21. 65 23. 62 22. 03 28. 46 35. 85 28 22. 71 17. 36	Dolls. Dolls. 27.79 28.85 20.96 18.00 24.22 29.07 27.79 29.13 34.33 37.14 22.76 21.98 22.78 21.98 25.21 18.52 13.85	Dolls. 25. 69 19. 92 29. 68 21. 60 29. 10 35. 30 22. 64 22. 09 11. 95	Dolls. 23. 76 23. 78 27. 28 24. 50 26. 06 32. 21 27. 27 27. 21 17. 58

Bureau of Agricultural Economics. Compiled from the Minneapolis Daily Market Record. Prices are simple averages of daily quotations.

Table 30.—Wheat: Volume of trading in futures, all contract markets, by months, 1923-24 to 1930-31

Months	1923-24	1924-25	1925-26	1926-27	1927-28	1923-29	1929-30	1930-31
July Angust September October November December January February March April May June Total	Million bushels 808 784 678 785 677 528 378 417 594 451 374 850 7.817	Million bushels 1, 333 1, 300 1, 008 1, 596 1, 340 1, 528 1, 908 1, 781 2, 273 1, 482 1, 558 1, 759 18, 876	Million bushels 1, 460 1, 551 1, 573 1, 573 1, 500 1, 456 1, 284 1, 864 1, 397 1, 222 1, 204	Million bushels 1, 428 1, 226 1, 156 1, 090 1, 227 704 551 920 846 1, 260 1, 164 12, 584	Million bushels 1, 018 1, 144 918 838 543 834 508 923 1, 590 1, 471 941	Million bushele 996 1, 133 818 916 750 517 1, 085 892 1, 083 1, 361 1, 253 1, 391 12, 196	Million bushels 2, 889 2, 265 1, 401 1, 738 1, 805 1, 608 1, 384 1, 201 1, 501 1, 501 1, 377	Million bushels 1, 306 1, 531 1, 216 1, 160 1, 094 529 347 369 433 706 635 737

Grain futures administration.

Table 31.—Wheat: Volume of trading in futures, contract markets, by markets and by months, 1930-31

Month	Chicago Board of Trade	Chicago Open Board	Minne- apolis	Kansas City	Duluth	St. Louis	Mil- waukee	Seattle	Port- land	Omaha	New York
July	bushels 1, 129 1, 264 1, 012 967 888 419 289	Million bushels 32 35 32 34 24 24 13 16 31 29 30	Million bushels 50 104 74 82 45 18 14 47 48 39	Million bushels 79 82 58 54 66 83 13 12 15 36 38	Million bushels 12 40 35 27 28 15 10 6 6 20 9 12	Million bushels 1 1 3/2 2 2 1/4 1/4 2 1/4 1/4	2 2 1 2 1 1 1 1 1 1	Afillion bushels 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	bushels 2 1 1 1	bushels (¹)	Million bushels (*)
Total	8, 360	297	581	516	220	9	15	12	13	15	25

Grain Futures Administration.

¹ Trading in Omaha started in June. Less than 100,000 bushels previous to January.
² Trading in New York started in March.

Table 32.—Wheat: Amount of open commitments in the various futures on the Chicago Board of Trade, semimonthly, June 30, 1930—June 30, 1931

				Future			
Date	July	Septem- ber	Decem- ber	March	May	June	All futures
1930 fune 30	2 2 2 4 10	3	Million bushels 35 44 57 86 98 109 99 93 89 67 29 5	Million bushels	Afillion bushels 9 21 39 54 64 77 95 104	Mulion bushels	Million bushels 100 110 120 141 141 165 167 174 188 189 165 155 155 155 155 155 155 155 155 155
1931  19an, 15	27 28 30 28 32 34 37 35 35 32 31 31 31 31 31 31 31 31 31 31 31 31 31	4 7 10 14 16 21 22 26 30 40	3 7 8 12 16 21	9 10 9 10 4	95 94 91 86 82 76 71 51 28	111111111111111111111111111111111111111	14 13 13 13 13 12 12 11

Grain Futures Administration.

Table 33.—Wheat: Volume of trading in futures on the Chicago Board of Trade, by crop years, 1921-22 to 1930-31

Crop year	Quantity	Crop year	Quantity	Crop year	Quantity
1921-22 1922-23 1923-24 1924-25	Bushels 12,814,000,000 9,625,000,000 6,124,000,000 16,587,000,000	1925-26 1926-27 1927-28 1928-29	Bushels 15, 869, 000, 000 10, 619, 000, 000 9, 203, 000, 000 9, 908, 000, 000	1929-30 1930-31	Bushels 16, 599, 000, 000 8, 360, 000, 000

Grain Futures Administration.

Table 34.—Rye: Acreage, production, value, exports, etc., United States, 1909-1931

				Price	_	Price per bushel	Foreign	trade, inc	luding flo ng July <sup>2</sup>	our, year
Year	Acre- age har-	Aver- age yield	Produc- tion	per bushed received	Farm value, basis Dec. 1	of No. 2 rye at Minne-			Net ex	ports *
	vested	per acre		by pro- ducers Dec. 1	farm price	apolis year begin- ning July <sup>1</sup>	Domes- tic ex- ports	Import3	Total	Percent- age of produc- tion
1909	1,000 acres 2, 196	Bushels of 56 lbs. 18.4	1,000 bushels 29,520	Cents	1,000 dollars	Cents	1,000 bushels	1,000 bushels	1,000 bushels	Per cent
1909 1910 1911 1912 1913 1914 1916 1916 1917 1918 1919 1919 1919 1920 1921 1922 1923 1924 1924 1925 1928 1928 1929	2, 196 2, 185 2, 117 2, 157 2, 557 2, 557 2, 557 2, 557 2, 579 4, 391 4, 799 4, 799 4, 858 3, 717 8, 380 3, 3054	16. 4 16. 0 15. 6 16. 8 16. 2 16. 2 17. 3 15. 2 14. 6 12. 7 15. 1 14. 9 10. 9 10. 9 11. 1 14. 9 10. 9 11. 1 14. 1 16. 3 17. 3 18. 3 19. 4 19. 5 19. 5 19	25, 526 34, 897 33, 119 35, 664 41, 2719 54, 050 48, 862 62, 933 91, 041 61, 070 104, 700 55, 674 56, 674 57, 556 32, 884 37, 556 34, 950	72. 2 71. 5 83. 2 66. 3 83. 4 86. 5 83. 4 122. 1 166. 0 151. 6 88. 2 67. 6 61. 9 106. 3 76. 5 81. 4 84. 4 84. 4	25, 548 24, 953 27, 557 23, 636 26, 29, 20 37, 018 45, 083 59, 676 104, 447 138, 038 100, 206 78, 329 41, 644 70, 77, 33, 335 61, 282 30, 961 26, 937 43, 687 29, 687	70 77 86 60 58 94 135 193 158 160 161 161 114 88 98 98 98 95	242 40 31 1, 856 2, 273 13, 023 17, 186 36, 467 41, 531 47, 337 29, 944 51, 663 19, 902 50, 242 12, 647 21, 698 26, 346 9, 483 2, 600	30 227 134 1 1 37 147 566 428 834 638 1,077 455 700 99 92 1	212 4 187 4 103 1, 854 2, 236 12, 880 14, 684 13, 275 16, 352 35, 829 40, 454 46, 885 29, 244 51, 564 19, 900 50, 241 12, 646 21, 697 25, 345 9, 487 2, 599	0.6 .5 .5.2 .5.4 .30.1 .27.2 .28.0 .39.4 .27.2 .28.0 .39.4 .27.2 .28.0 .39.4 .29.2 .30.9 .49.2 .30.9 .40.2 .50.2

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board, revised 1919 to 1928. See introductory text; italic figures are census returns. See 1927 Yearbook, page 764, for data for earlier years.

<sup>&</sup>lt;sup>1</sup> Prices are from Minneapolis Daily Market Record and are averages of daily prices weighted by car-lot

<sup>&</sup>lt;sup>2</sup> Compiled from Commerce and Navigation of the United States, 1909-1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June issues, 1919-1926; January and June issues, 1927-1931, and official records of the Bureau of Foreign and Domestic Commerce. Rye—General imports, 1909; imports for consumption, 1910-1931. Rye flour—Imports for consumption, 1909-1931. Rye flour converted to rye on the basis that 1 barrel of rye flour is the product of 6 bushels of grain.

<sup>8</sup> Total exports (domestic plus foreign) minus total imports.

<sup>8</sup> Preliminary.

Table 35.—Rye: Acreage harvested and production, by States, average 1924-1928, annual 1928-1931

		Acres	ige harve	ested			P	roductio	n	
State and division	Aver- age, 1924- 1928	1928	1929	1930	1931 1	Aver- age, 1924- 1928	1928	1929	1930	19311
New York New Jersey Pennsylvania	1,000 acres 29 37 103	1,000 acres 20 28 103	1,000 acres 20 31 127	1,000 acres 24 28 127	1,000 acres 20 21 135	1,000 bushels 407 624 1,392	1,000 bushels 270 462 1,288	1,000 bushels 300 527 1,651	1,000 bushels 384 504 1,842	1,000 bushels 340 357 2,025
North Atlantic.	168	151	178	179	176	2, 422	2, 020	2, 478	2, 730	2, 722
Ohio Indiana Illinois Michigan Wisconsin Minnesota Iowa Missouri North Dakota South Dakota Nebraska Kansas	42 111 60 185 250 465 89 16 1,333 169 210	26 72 48 167 167 421 49 15 1, 298 168 230 20	50 100 48 147 188 412 45 15 986 230 244 14	42 87 58 140 194 424 45 14 1, 223 414 317 18	74 126 64 158 175 365 41 28 819 373 333 25	556 1, 341 873 2, 501 3, 065 7, 076 619 147 16, 277 2, 049 2, 448 362	273 720 667 2, 171 1, 754 5, 684 760 135 14, 278 1, 646 2, 875 310	630 1, 120 696 1, 632 2, 256 6, 633 698 112 9, 367 2, 714 2, 928 147	504 1, 088 870 1, 820 2, 425 6, 869 720 140 14, 064 6, 293 4, 121 189	1, 332 1, 827 992 2, 133 2, 188 5, 475 615 336 4, 914 2, 723 2, 997 300
North Central	2, 912	2,679	2,479	2,976	2,581	37, 314	31, 273	28, 933	39, 103	25, 832
Delaware	16 34 12 58	4 16 83 10 51 8 16	5 19 42 11 54 7	5 19 40 11 49 7	7 21 70 16 64 8 13	54 226 377 126 442 71 108	58 192 396 115 382 68 104	72 238 437 106 432 63 72	70 285 460 126 392 56 65	122 378 1, 141 259 576 76 110
South Atlantic	148	138	150	141	199	1, 405	1, 315	1, 420	1, 454	2, 662
Kentucky Tennessea Oklahoma Texas	16	9 13 9 3	18 16 8 3	14 14 7 2	24 22 9 3	200 117 147 41	104 82 72 34	171 104 71 42	147 98 70 20	360 176 117 46
South Central	58	84	45	37	58	505	292	388	335	699
Montana Idaho Wyoming Colorado Utah Washington Oregon	8 45 78 4	90 4 34 60 3 20 19	67 4 32 64 3 12 20	68 4 30 74 8 9 22	20 3 25 53 8 10 15	888 41 353 675 32 238 206	1, 215 58 272 552 24 250 285	502 44 294 512 25 84 270	442 48 255 629 27 81 275	100 30 112 871 15 75 128
Western	228	230	202	210	129	2, 433	2, 656	1,731	1, 757	831
United States	3, 509	3, 232	8, 054	3, 543	3, 143	44, 081	37, 556	34, 950	45, 379	32, 746

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

<sup>&</sup>lt;sup>1</sup> Preliminary.

Table 36.—Rye: Yield per acre, average 1919-1928, annual 1926-1931, and estimated price per bushel December 1, average 1925-1929, and annual 1926-1931, by States

			Yiel	d per	acre			Est	imate	d pri	ce per	bush	el De	c. 1
State and division	Av., 1919– 1928	1926	1927	1928	1929	1930	1931	Av., 1925– 1929	1926	1927	1928	11/29	1930	1931
New York New Jersey Pennsylvania	14. 2 16. 4	Bus. 12. 5 17. 5 13. 5	15.0 18.0	13. 5 16. 5	15. 0 17. 0	16.0	17. 0 17. 0	98	Cts. 100 95 97	Cts. 105 97 105	Cts. 112 104 107	Cts. 114 103 106		Cts. 53 53 51
North Atlantic				13. 4	13. 9	15.3	15. 5	102.8	96.9	102. 9	106. 9	106. 3	76.6	51.5
Ohio Indiana Illinois Michigan Wisconsin Minnesota Iowa Missouri North Dakota South Dakota Nebraska Kansas	11.3 12.8 11.2	7.6 6.2 9.0	16. 7 18. 5 13. 0	10. 0 14. 5 13. 0 10. 5 13. 5 9. 0 11. 0 9. 8	11. 2 14. 5 11. 1 12. 0 16. 1 15. 5 7. 5 9. 5	12.5 15.0 13.0 12.5 16.2 16.0 10.0 11.5 15.2 18.0	14. 5 15. 5 13. 5 12. 5 15. 0 15. 0 12. 0 6. 0 7. 3	88 90 85 86 80 84 111 74 75 75	88 85 86 78 84 76 82 113 73 73 76 94	88 92 89 90 85 86 110 80 79	92 93 90 85 86 106 78 79	90 89 88 89 82 85 107 76 76 76	67 55 53 55 45 31 48 77 24 25 38	
North Central		9. 5	16.0	11, 7	11.7	13.1	10.0	78. 8	77.8	82. 4	81.8	80.8	32. 5	34.7
Delaware	13. 0 10. 4 10. 5 7. 0 8. 1	15.0 12.0 11.0 8.0 10.0	12. 5 10. 5 11. 0 8 0 10. 0	12. 0 12. 0 11. 5 7. 5 8. 5	12. 5 10. 4 9. 6 8. 0 9. 0	15.0 11.5 11.5 8.0 8.0	18. 0 16. 3 16. 2 9. 0 9. 5	111 119 114 140 187	110 125 175	110 115 110 135 175	115 120 115 145 185	110 120 116 140 190	115 96 123 168	50 55 52 71 92
South Atlantic	8. 9	10.0	9.4	9. 5	9. 5	10.3	13. 4	131. 6	121. 9	128. 8	133.8	130. 5	112.9	60.1
Kentucky Tennessee Oklahoma Texas	8.5	9.6 11.0	8. 5	6.3 8.0	6. 5 8. 9	10.0	8. 0 13. 0	130	90	129 99	138	90	68	65 40
South Central	9. 0	12.2	8. 1	8.6	8. 6	9.1	12. 1	114. 1	105.4	116. 0	120. 2	116. 0	91.9	53, 1
Montana Idaho Wyoming Colorado Utah Washington Oregon	12. 6 8. 2 9. 3 9. 2 11. 7	12.5 8.0 9.0 10.5	11. 0 7. 5 9. 5 9. 0 16. 0	14. 5 8. 0 9. 2 8. 0 12. 5	11. 0 9. 2 8. 0 8. 4 7. 0	12.0 8.5 8.5 9.0	10. 0 4. 5 7. 0 5. 0 7. 5	77 68 70 88	73 67 71 80 100	75 69 70 82 90	72 72 70 87 90	85 68 71 91 95	33 37 60 60	45 40 31 62 55
Western	10.4	10.2	12.7	11.5	8. 6	8.4	6.4	75.9	76.8	76. 1	75.3	79. 4	38.8	40.9
United States	12. 5	9.8	15.8	11.6	11. 4	12.8	10.4	82. 4	81.9	84. 3	84.4	84. 9	38.4	38.7

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

TABLE 37.—Rye: Acreage, yield per acre, and production in specified countries, average 1921—22 to 1925—26, annual 1928—29 to 1931—32

Columb   C				Астевве				KĀ !	Yield per acre	g			1	Production		
Color   1,000   1,00	Country	Average 1921–22 to 1925–26	1928-29	1929-30	1630-31	1931-321	Average 1921–22 to 1925–26	1928-29	1929-30	1930-31	1931-321	Average 1921-22 to 1925-26	1928-29	1929-30	1930-31	1931-324
6, 286         4, 320         4, 046         4, 991         3, 921         14.0         13.4         11.0         13.5         9.7         88, 012         67, 684         48           836         682         683         683         683         683         683         28.9         28.9         30.3         38.9         20.9         11.0         487         11.0         11.0         11.0         487         11.0         11.0         487         11.0 <td< td=""><td>Northern hemisphere North America: Canada. United States.</td><td>1,000 acres 1,386 4,900</td><td>1,000 acres 840 3,480</td><td>1,000 acres 992 3,054</td><td>1,000 acres 1,448 3,543</td><td>1,000 acres 778 3,143</td><td>Bushels 14.4 13.9</td><td>Bushels 17.4 12.5</td><td>Bushels 13. 3 11. 4</td><td>Bushels 15.2 12.8</td><td>Bushels 6.8 10.4</td><td>1,000 bushels 19, 994 68, 018</td><td>1,000 bushels 14,618 43,366</td><td>1,000 bushels 13,160 34,950</td><td>1,000 bushels 22,018 45,379</td><td>1,000 bushets 5,322 32,746</td></td<>	Northern hemisphere North America: Canada. United States.	1,000 acres 1,386 4,900	1,000 acres 840 3,480	1,000 acres 992 3,054	1,000 acres 1,448 3,543	1,000 acres 778 3,143	Bushels 14.4 13.9	Bushels 17.4 12.5	Bushels 13. 3 11. 4	Bushels 15.2 12.8	Bushels 6.8 10.4	1,000 bushels 19, 994 68, 018	1,000 bushels 14,618 43,366	1,000 bushels 13,160 34,950	1,000 bushels 22,018 45,379	1,000 bushets 5,322 32,746
28         18         18         19         15         27.9         27.6         28.9	Total		4,320	4, 046	4,991	3, 921			11.9	13. 5	9.7	88,012	57, 984	48, 110	67, 307	38, 068
Extles 39, 663 40, 109 41, 499 42, 127 40, 390 19, 6 22. 4 22. 5 21.8 18 9 776, 898 888, 580	Europe:  Norway  Sweden  Sweden  Demnark  Notherlands  Bogium  Luzemburg  France  Gortunal  Italy  Austra.  Cocoboslovakra  Hungaria  Rumania  Poland  Idrinania  Idrinania		888 881 881 881 115 115 116 116 117 118 118 118 118 118 118 118 118 118				28448888888888844888888888888888888888				%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%	4444 42444 42444 4444 4444 4444 4444 4	25,000 Per p	25.25	556 556 556 556 556 556 556 556 556 556	25 204 25 20 20 20 20 20 20 20 20 20 20 20 20 20
	Total European countries reporting all years	39, 663	40, 109	41, 499	42, 127	40, 390	19.6	22.4	22.5			776, 898	898, 580	933, 497	917, 920	764, 771

905, 000 940, 000 920, 000 773, 000	956, 564 981, 607 985, 317 802, 839	970, 000 1, 004, 000 1, 008, 000 825, 000		146 130 120	81	980, 000 1, 010, 000 1, 014, 000
784, 000   905	864, 910 956	879, 000 970		8,061 8,061		884, 000   980
	18.1			9 9		
	20.9			15.0 7.5		
	21.6			16.2	13.6	
	21.5			10.2		
	18.8			16.0		
41, 200	41, 311	45, 800		1,378		
42,700	47, 118	48, 400		8 626		49, 200
42,100	45, 645	46,800		543	<b>6</b>	47,500
40, 600	44, 429	46,000		867	3 5	47,000
40,400	46,948	47, 100		4884	'	47, 700
Estimated European total, excluding Russia	Total Northern Hemisphere countries reporting all years.	Estimated Northern Hemi- sphere total, excluding Rus- sla and China	BOUTHERN HEMISPHERE	Chile. Argentina. Union of South Africa	Australia New Zealand	Estimated world total, excitoding Russia and China.

Bureau of Agricultural Economics. Both agreege and production figures refer to the year of harvest. Harvests of the Northern Hemisphere which immediately follow; thus for 1930-31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931.

Area sown.

4-year average.

1 Preliminary.

4 8-year average.

Less than 500 acre

Table 38.—Rye: World production, 1894-95 to 1931-32

		North-				Sel	ected cou	ntries		
Crop year	World produc- tion ex- cluding Russia and China	Hemi- sphere produc- tion ex- cluding Russia and China	Euro- pean produc- tion ex- cluding Russia	Russia <sup>1</sup>	United States	Ger- many	France	Poland	Hun- gary	Czecho- slovakia
1894-95 1895-96 1896-97 1897-98 1898-99 1899-1900 1901-12 1902-3 1903-4 1904-5 1905-6 1906-7 1906-10 1910-11 1911-12 1914-15 1914-15 1914-15 1914-15 1914-15 1914-15 1914-15 1914-15 1915-16 1916-17 1916-17 1917-18 1918-19 1912-22 1922-23 1924-25 1924-25 1924-25 1925-26 1926-27 1928-29 1928-29 1928-29 1930-31 6 1930-31 6	Million bushels 683 620 664 599 667 7710 675 690 783 783 785 782 787 781 827 827 827 827 875 691 663 548 822 765 691 619 859 869 869 869 869 869 869 869 869 869 86	Milition bushels 662 663 663 666 708 666 708 666 708 667 767 751 781 785 689 661 545 545 545 545 545 545 545 545 545 54	Multion bushels 618 618 618 618 629 644 629 721 736 776 821 738 466 721 621 621 621 621 621 621 621 621 621 6	Million bushels 883 773 790 654 785 789 789 789 781 614 785 787 868 875 789 781 614 787 787 896 875 787 896 875 787 896 875 787 896 875 787 896 818	Million bushels 30 33 33 33 35 35 35 35 35 35 35 35 35 35	Million bushels 279 260 286 273 337 321 320 233 226 331 321 322 283 321 322 283	Million bushels 75 72 70 70 86 67 69 58 68 53 559 51 44 47 45 65 65 65 65 65 65 65 65 65 65 65 65 65	Million bushels	Affilition bushels 58 47 51 46 53 54 42 44 48 47 55 56 45 52 23 25 52 22 23 33 12 22 22 33 33 33 13 22 22 23 33 33 22 22 23 33 33 33 33 33	Million bushels

Bureau of Agricultural Economics. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus, for 1930-31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931.

Includes all Russian territory reporting for the years shown.
 Exclusive of the 10 Vistula Provinces of Russian Poland and the Province of Batum in Transcaucasia.
 Exclusive of Russian Poland, Lithuania, parts of Latvia and the Ukraine, and the two Provinces of Batum and Elizabetpol in Transcaucasia.

Beginning with this year, estimates for the present territory of the Union of Socialist Soviet Republics exclusive of Turkestan, Transcaucesia, and the Far East, which territory in 1924 produced 8,646,000 bushels.
 Beginning with this year postwar boundaries, therefore not comparable with earlier years.
 Preliminary.

Table 39.—Rye: Monthly marketings by farmers, as reported by about 3,500 mills and elevators, United States, 1921-22 to 1930-31

					Perc	entage	of Yea	r's rec	ipts				
Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Sea- son
1921-22 1922-23 1923-24 1924-25 1925-26 1926-27 1927-28 1922-29 1929-30 1930-31	13.9 10.7 5.3 8.9 5.2 8.0 4.7 4.5 12.3 12.7	20. 8 20. 5 18. 8 16. 9 19. 2 20. 1 19. 0 19. 5 34. 0 33. 4	17. 6 14. 8 19. 2 25. 4 23. 3 19. 7 25. 6 27. 0 18. 0 22. 5	10. 6 12. 3 14. 2 23. 3 12. 4 13. 0 17. 5 16. 3 11. 6	6.3 10.2 9.4 10.7 8.7 8.5 9.8 9.3 6.6 4.5	5.77 8.55 7.09 6.8 6.10 4.0	4.5 6.5 5.4 5.0 6.6 6.0 4.4 4.5 3.4 2.4	485.393.14.6 6.04.15.1233	4.9 4.0 3.5 1.7 3.1 3.7 2.9 1.7 1.8	4.09 2.55 1.00 2.44 2.64 1.9 1.48	4.2 2.2 3.2 2.3 2.3 2.3 2.3 1.4 1.5 1.8	2.59 4.38 4.38 2.34 1.52 1.3	100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0

Bureau of Agricultural Economics.

TABLE 40.—Rye: Receipts at specified markets, 1921-22 to 1930-31

Year beginning July	Minne- apolis	Duluth	Chicago	Milwau- kee	Omaha	Total, 5 markets	Fort William and Port Arthur
1921-22 1922-23 1923-24 1924-25 1925-26 1925-27 1927-23 1928-27 1928-29 1928-30 1930-31 2	1,000 bush. 4,754 15,111 13,336 8,447 7,872 4,123 5,423 7,375 7,057 9,484	1,000 bush. 17, 444 42, 744 16, 836 38, 496 10, 907 13, 351 25, 083 10, 881 7, 039 3, 140	1,000 bush. 4, 235 7, 585 2, 952 12, 586 2, 426 2, 355 4, 151 5, 288 7, 623 3, 512	2, 282 3, 241 1, 449 2, 733 876 1, 268 673 1, 053 736 242	1,000 bush. 2, 048 1, 916 736 1, 207 892 941 1, 554 1, 755 778	1,000 bush. 80, 763 70, 597 85, 309 63, 469 22, 978 22, 038 36, 899 25, 951 24, 215 17, 156	1,000 bush. 6, 297 11, 552 6, 837 5, 265 5, 329 7, 763 11, 963 8, 180 5, 391 7, 024

Bureau of Agricultural Economics. Compiled from reports of Minneapolis Chamber of Commerce, Duluth Board of Trade, Chicago Board of Trade, Milwankee Chamber of Commerce, Omaha Grain Exchange, Grain and Feed Journal, and Canadian Grain Statistics.

Table 41.—Rye: Classification of receipts graded by licensed inspectors, all inspection points, 1923-24 to 1930-31

			Gra	ıde		
Year beginning July	No. 1	No. 2	No. 3	No. 4	Sample	Total
1923-24 1924-25 1925-28 1925-27 1927-72 1927-28 1928-29 1928-30 1930-31	Cars 14, 394 27, 977 3, 969 3, 892 10, 659 1, 787 8, 985 5, 804	Cars 13, 532 24, 251 11, 730 9, 921 15, 573 13, 081 10, 611 9, 320	Cars 3, 872 8, 841 5, 111 5, 794 4, 976 6, 646 1, 642 1, 198	Cars 1, 061 2, 957 1, 794 3, 597 1, 409 1, 994 475 225	Cars 478 876 494 1,445 564 626 288 103	Cars 33, 332 64, 902 23, 098 24, 648 33, 181 24, 134 22, 001 16, 650

Bureau of Agricultural Economics.

<sup>1</sup> Crop year begins September.

<sup>&</sup>lt;sup>2</sup> Preliminary.

Table 42.—Rye: Commercial stocks in store, 1926-27 to 1930-31

# DOMESTIC RYE IN UNITED STATES:

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Мау	June
1926-27	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels			1,000 bushels 13,897	1,000 bushels 13, 905	1,000 bushels 7.818	1,000 bushels 8,783
1927-28 1928-20 1920-30 1930-31	1, 018 2, 499 6, 632 12, 481	1,454 2,170 6,614 12,073		17,010	17, 291	17, 173		4, 027 6, 185 14, 536 15, 629		5, 090 6, 914 14, 285 13, 199	5, 544 6, 598 13, 701 10, 990	2, 662 6, 532 12, 572 10, 599
1931-32	9, 989	9,838	9, 405	10, 095	10, 376	10, 431						

#### UNITED STATES RYE IN CANADA

1926-27. 1927-28. 1, 405 1928-29. 750 1929-30. 1, 182 1930-31. 3, 789 1931-32. 1, 682	589 449 1, 255 8, 761 1, 792	686 1,388 357 838 1,540 2,900 3,432 3,130 1,775 1,220	2,883	1, 208 1, 478 2, 113 2, 900 782	1, 658 930 1, 707 2, 734 2, 131	1,704 772 1,426 2,720 2,128	1, 583 351 1, 255 2, 519 2, 126	1, 384 259 1, 310 2, 692 2, 119	3, 379 47 1, 867 2, 871 2, 110	869 512 1,379 8,821 1,911
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#### CANADIAN RYE IN UNITED STATES:

1926-27 1927-23 1928-29 1929-30	63 248 380	50 255 394	20 12 432	124 83 320	441 205 429	802 258 431	2, 266 851 208 431	1, 922 458 532 431	1,631 203 559 371	494 90 440 870	689 90 451 426	792 371 480 270
1930-31 1930-31 1931-82	188 2	187	172 2	172 390	430 388	651 1, 405	489	446	528	849	273	270

Bureau of Agricultural Economics. Compiled from weekly reports to the grain, hay, and feed market news service. Data are for stocks on the Saturday nearest the 1st day of the month.

Table 43.—Rye: Estimated average price per bushel received by producers, United States, 1922-28 to 1931-32

Crop year	July 15	Aug. 15	Sept.	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	Weight- ed aver- age
1922-23 1923-24 1924-25 1925-26 1925-27 1927-28 1927-28 1922-29 1929-30 1930-31 1931-32	Cents 74. 0 56. 3 68. 8 92. 3 80. 7 91. 2 99. 2 85. 3 43. 6	55, 3 79, 8 92, 8 86, 1 80, 6 83, 6 91, 8	57. 2 80. 1 81. 9 81. 6 81. 4 81. 8 89. 2 53. 1	65. 2 58. 8 105. 7 74. 1 82. 4 81. 0 87. 1 89. 9 47. 6	62, 1 108, 6 73, 4 83, 0 84, 0 86, 3 85, 5 41, 6	63.9 112.7 86.8 82.4 87.8 87.2 88.4 41.1	71. 7 63. 5 126. 2 88. 2 83. 6 88. 0 87. 9 85. 7 37. 4	71. 0 64. 5 132. 2 82. 5 88. 4 89. 5 91. 5 78. 3	70.1 62.8 125.1 73.4 86.4 96.0 91.5 68.4	70.8 60.4 100.9 73.8 85.2 99.8 86.0 68.7	60.1 103.6 72.5 90.1 111.5 79.1 63.8	61.6 101.8 76.0 94.9 106.8 75.7 60.7	59. 4 96. 3 83. 1 84. 2 84. 7 85. 4 87. 7

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by monthly marketings. Mean of prices reported on 1st of month and 1st of succeeding month, July, 1922–December, 1923.

<sup>&</sup>lt;sup>1</sup>Includes rye in store in public and private elevators in 42 important markets and also the rye afloat in vessels or barges in harbors of lake and scaboard ports. Rye in transit either by rail or water, mill stocks or small private stocks of rye intended only for local purposes, not included.

<sup>2</sup>Includes rye stored at lake and scaboard ports, exclusive of rye in transit on lakes and canals.

Table 44.—Rye, including flour in terms of grain: International trade, average 19:25-26 to 1929-30, annual 1927-28 to 1930-31

	Year beginning July												
Country	A verage 1925 to 1929–30		1927	1927-23		-23	1923	) <del>-</del> 30	1930-31 1				
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports			
PRINCIPAL EXPOET- ING COUNTRIES  Germany United States. Russia. Poland. Hungary. Canada. Argentina. Rumania. Bulgaria. Yugoslavia 4. Algeria 4.  Total.	2 7, 482 6, 597 6, 559 6, 328 4, 511 1, 133 486 176	1,000 bushels 13,815 0 0 2,453 1 129 0 12 0 6 2 2	1,000 bushels 10, 199 26, 346 5, 901 375 4, 432 10, 379 7, 060 2, 187 807 13 40	1,000 bushels 24,861 0 0 4,831 1 114 0 0 0 29,825	1,000 bushels 22,965 9,488 237 1,415 5,136 6,430 5,862 3,914 1,046 54 62	1,000 bushels 7,234 0 0 792 1 166 0 8 8 9 6	1,000 bushels 20,444 2,600 14,150 5,942 835 1,916 2661 14 60	298 0 30 0 1	1,000 bushels 4,513 195 15,743 3,321 1,961 2,162 2,444	1,000 bushels 1,233 0 10 18 0 18 3 0			
PRINCIPAL IMPORTING COUNTRIES  Denmark Norway Finland Czechoslovakia Austria Netherlands	10 963 103 528	8, 109 7, 027 6, 193 4, 701 4, 645 4, 525	417 10 102 101 629	7, 461 7, 307 4, 932 7, 622 4, 617 4, 147	392 1,664 64 531	7, 216 6, 024 7, 757 2, 581 5, 054 8, 451	394 9 2,815 69 207	10, 767 7, 047 6, 509 502 5, 258 4, 943	980 86 1,454	13, 471 5, 216 3, 136 717 4, 592 11, 348			
Latvia 4 Sweden Estoma Belgium France United Kingdom 5 Italy Switzerland	43 31	3, 203 3, 008 2, 244 1, 625 1, 535 696 386 91	9 636 67 8 83 17	1, 960 4, 177 1, 085 753 753 717 107 53	33 5 42 1	5, 386 4, 550 2, 680 376 573 489 219 6	12 49 15 12 25 1	3, 914 4, 225 3, 591 1, 598 441 315 575 296	240 19 13 1 0	465 1, 131 515 6, 294 4, 284 346 1, 324 296			
Total	2, 761	47, 988	2, 079	45, 631	3, 020	46, 362	3, 608	49, 981	3, 241	53, 135			

Bureau of Agricultural Economics. Official sources except where otherwise noted.

1 Preliminary.

24-year average.

3 Monthly Crop Report and Agricultural Statistics.

4 Year beginning August 1; International Yearbook of Agricultural Statistics.

5 Calendar year.

Table 45.—Rye No. 2: Weighted average price 1 per bushel of reported cash sales, Minneapolis, 1922-23 to 1931-32

Crop year	July	Aug.	Sept.	Oet.	Nov.	Dec.	Jan.	Feb.	Mar,	Apr.	Мау	June	Weight- ed aver- age
1922-22 1922-24 1924-25 1925-25 1925-27 1927-28 1928-29 1929-30 1930-31 1931-32	Cents 76 61 83 95 102 104 111 107 55	Cents 69 62 86 100 97 92 94 98 60 38	Cents 66 66 95 83 93 92 94 97 55	Cents 71 66 121 77 95 92 94 97 49	Cents 81 64 123 81 94 99 98 95 43 51	Cents 83 65 133 98 94 102 97 98 44 45	Cents 82 67 154 99 99 103 101 91 38	Cents 80 66 154 91 102 106 105 78 37	Cents 76 63 130 81 99 114 100 66 36	Cents 81 61 106 85 99 124 89 68 35	Cents 72 63 114 83 109 128 85 65 36	Cents 64 70 111 89 111 123 84 57 37	C'ents 75 65 114 88 98 104 95 90 51

Bureau of Agricultural Economics. Compiled from Minneapolis Dally Market Record. Chicago prices, 1909–1927 appear in 1927 Yearbook, Table 48. Minneapolis prices, 1909–1921, appear in 1930 Yearbook, Table 43.

<sup>1</sup> Average of daily prices weighted by car-lot sales.

Table 46 .- Coin: Acreage, production, value, exports, etc., United States, 1890-1931

								Foreign year	trade, i r begin:	ncluding ning July	meal,
;		Aver-	Produc-	Produc-	Price per bushel re-	Farm value, basis	Price per bushel			Net cyp	orts 3
Year	Acreage	age yield per core	tion	tion as grain	ceived by pro- ducers Dec. 1	Dec. 1 farm price	at Chi- cago <sup>1</sup>	Do- mestic exports	Im- ports	Total '	Per- cent- age of pro- duc- tion
1890 1891 1892 1893 1894 1895 1896 1897 1898	72, 610 74, 434 69, 396 85, 567 86, 560 88, 127 88, 304	Bushcls of 56 lbs. shelled 20. 7 27. 6 23. 6 20. 9 19. 3 27. 0 28. 9 24. 3 25. 6	1,000 bushels 1,460,406 2,055,823 1,713,572 1,339,680 2,310,962 2,310,962 2,144,553 2,261,444,553 2,261,444,553		Ceats 50. 0 39. 7 38. 8 35. 9 45. 1 25. 0 21. 3 26. 0 28. 4	1,000 dollars 729, 647 816, 917 644, 390 612, 998 604, 523 578, 408 532, 884 553, 309 642, 747	Cents 58 47 41 41 44 26 25 30 34	1,000 bushels 32, 042 76, 602 47, 122 66, 490 28, 585 101, 100 178, 817 212, 056 177, 255	1,000 bushels 2 16 2 3 17 5 7 4	1,000 bushels 32,039 76,596 47,120 66,487 101,096 178,811 212,052 177,252	Per cent 2.2 8.7 2.7 3.9 2.1 4.4 7.1 9.9 7.8
1899 1990 1900 1901 1902 1903 1904 1905 1906 1907 1908 1909	94, 914 94, 914 95, 042 94, 636 95, 517 90, 661 93, 340 93, 643 94, 971 95, 603 98, 535	25. 9 26. 4 27. 4 25. 9 27. 1 29. 4 30. 9 26. 6 26. 6	2, 666, 524 2, 454, 628 2, 505, 148 1, 613, 528 2, 346, 897 2, 346, 897 2, 528, 662 2, 748, 949 2, 512, 065 2, 544, 957 2, 544, 957 2, 552, 190		85.1 60.1 40.1 42.1 43.7	784, 916 878, 243 969, 285 1, 049, 791 987, 882 1, 105, 690 1, 120, 513 1, 138, 053 1, 277, 607 1, 527, 679	36 43 62 47 49 48 44 50 68 65	218, 123 181, 405 28, 029 76, 639 58, 222 90, 293 119, 894 86, 368 55, 064 87, 665	3 5, 19 41 17 16 11 11 20 258	213, 121 181, 400 28, 011 76, 598 58, 210 90, 278 119, 883 86, 358 55, 044 87, 437	8.7 7.2 1.7 2.9 2.5 8.6 4.4 8.0 2.2
1909 1910 1911 1912 1918 1914 1916 1916 1917 1918 1919	98, 383 104, 035 105, 825 107, 083 105, 820 103, 435 106, 197 105, 296 116, 730 104, 467 87, 772	26. 1 27. 7 23. 9 29. 2 23. 1 25. 8 28. 2 24. 4 26. 3 26. 7	2, 572, 336 2, 886, 260 2, 531, 488 8, 124, 746 2, 446, 988 2, 672, 804 2, 994, 793 2, 566, 927 8, 065, 233 2, 502, 665	2, £45, 893	58. 6 48. 0 61. 8 48. 7 69. 1 64. 4 57. 5 88. 9 127. 9 136. 5	1, 507, 185 1, 384, 817 1, 565, 258 1, 520, 454 1, 692, 092 1, 722, 070 1, 722, 680 2, 280, 729 3, 920, 228 8, 416, 240	59 58 71 53 70 70 79 111 163 162	38, 128 65, 615 41, 797 50, 780 10, 726 50, 668 39, 897 66, 753 49, 073 23, 019	118 53 54 903 12, 368 9, 899 5, 211 2, 270 3, 197 3, 346	88,010 65,562 41,744 49,913 41,639 40,816 34,761 65,092 45,950 19,684	1.5 2.8 1.6 1.6 1.5 1.2 2.5 1.5
1919 1920 1921 1922 1923	97, 170 101, 699 103, 740 102, 846 104, 324 82, 329	28. 9 81. 5 29. 6 28. 3 29. 3	2, 811, 302 8, 208, 584 8, 068, 569 2, 906, 020 8, 063, 557	2, 600, 891 1, 825, 880	134. 5 67. 0 42. 3 65. 8 72. 6	3, 780, 597 2, 150, 332 1, 297, 213 1, 910, 775 2, 217, 229	159 62 55 73 88	16, 729 70, 906 179, 490 96, 596 23, 135	10, 283 5, 791 142 182 240	6, 509 66, 116 179, 374 96, 415 22, 896,	2.1 5.8 3.3
1924 - 1924 1925 1926 1927 1928 1929 1930 1931 •	82, 529 100, 863 101, 302 99, 615 98, 393 100, 673 97, 806 100, 743 104, 970	22. 9 28. 8 27. 0 28. 1 28. 0 25. 9 20. 4 24. 4	2, 309, 414 2, 916, 106 2, 691, 531 2, 763, 093 2, 818, 901 2, 535, 386 2, 060, 185 2, 556, 863	1, 925, 880 1, 900, 204 2, 445, 632 2, 233, 173 2, 300, 845 2, 364, 069 2, 140, 177 1, 717, 383 2, 194, 574	98. 2 67. 4 64. 2 72. 3 75. 2 77. 4 65. 5 86. 0	2, 266, 771 1, 966, 162 1, 728, 970 1, 997, 759 2, 119, 046 1, 962, 832 1, 349, 218 920, 142	106 75 87 101 92 83 60	9, 791 24, 788 19, 819 19, 409 41, 874 10, 281 8, 317	4, 618 637 1, 098 5, 463 490 497 1, 747	5, 348 24, 150 18, 731 14, 364 41, 387 9, 788 1, 572	.2 .8 .7 .5 1.5 .4

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board and relate to equivalent production of grain on entire acreage grown for all purposes; italic figures are census returns. See 1927 Yearbook, p. 774, for data for earlier years.

Preliminary.

<sup>1</sup> Prices 1890-1898 are averages of the weekly quotations for No. 2 or better in annual reports of Chicago Board of Trade; subsequent prices are compiled from the Chicago Daily Trade Bulletin, average of daily prices weighted by car-lots sales, No. 3 yellow.

2 Compiled from Commerce and Navigation of the United States, 1890-1917; Foreign Commerce and Navigation of the United States, 1893, Monthly Summary of Foreign Commerce of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, 1918; June issues, 1919-1926; January and June issues, 1927-1931 and official records of the Bureau of Foreign and Domestic Commerce. Corn—General imports 1890-1931. Corn meal converted to terms of grain on the basis of 4 bushels of corn to a barrel of meal.

3 Total apports (domestic plus foreign) minus total imports.

4 Net imports, i. e., total imports minus total exports (domestic and foreign).

5 Corn harvested for grain; total screage of corn in 1924 is 98,401,627 acres.

6 Preliminary.

Table 47.—Corn: Acreage and production, by States, average 1924-1928, annual 1928-1931

				100	0 100	•				
			Acreage	•				Productio	n	
State and division	Aver- age, 1924- 1928	1928	1929	1930	1931 1	Average, 1924–1925	1	i 1929	1930	1931 1
Maine New Hampshire Vermont Massachusetts Rhode Island Connecticut New York New Jersey Pennsylvania		14 80 45 10 55 650 181 1, 283	40 9 50 566 170 1, 231	13 60 39 51 55 168 1, 219	13 64 37 8 51 566 170 1, 268	1, 950 373 2, 321 23, 197 7, 951 55, 440	560 3, 520 1, 890 390 2, 310 22, 100 6, 968 50, 037	533 2, 542 1, 560 372 2, 150 17, 603 6, 290 45, 547	585 2,580 1,755 378 2,142 16,650 6,048	598 2, 944 1, 591 344 2, 142 22, 074 6, 970 62, 766
North Atlantic			2, 154	2, 127	2, 191	96,048	88, 295	77, 117	57, 502	100, 017
Ohio- Indiana Illinois Michigan Wisconsin Minnesota Iowa Missouri North Dakota South Dakota Kebraska Kansas	6, 314 1, 068 4, 609 8, 910	6, 260 997 4, 469 8, 937	3, 473 4, 253 8, 575 1, 197 1, 942 4, 359 11, 048 5, 566 1, 005 5, 095 9, 516 6, 643	4, 466 8, 832 1, 245 1, 981 4, 533 11, 335 6, 123 1, 035 5, 146	9, 185 1, 407 2, 080 4, 896 11, 640 6, 184 1, 159 4, 837 10, 138	132, 495 156, 990 326, 691 50, 733 77, 770 137, 379 417, 137 175, 139 23, 952 98, 617 214, 381 131, 564	167, 802 367, 488 48, 944 89, 082 189, 026 464, 883 181, 540 24, 426 93, 849 212, 701	131, 843 304, 412 29, 925 67, 970 156, 924 444, 130 130, 801	117, 009 229, 632 26, 768 67, 354 140, 523 385, 390 85, 722 18, 112 82, 336 239, 100	168, 535 339, 845 40, 944 58, 240 115, 056 389, 940 170, 060 21, 442 25, 152 172, 346
North Central		63, 869	62, 672	64, 474	66, 162	1, 942, 848	2, 095, 584	1, 880, 560	1, 560, 927	1, 776, 318
Delaware Maryland. Virginia West Virginia North Carolina South Carolina Georgia Fiorida	136 536 1, 625 473 2, 350 1, 516 3, 840 582	530 1, 626 459 2, 305 1, 422 3, 620	134 499 1, 454 434 1, 985 1, 392 3, 432 648	138 508 1, 498 421 2, 233 1, 531 3, 432 648	146 545 1,527 446 2,345 1,608 3,672 674	4, 446 21, 064 41, 546 15, 649 46, 929 20, 780 47, 049 7, 971	1 44 715	35, 187 12, 326 37, 715 20, 184	6, 858 16, 478 5, 052 40, 194 22, 200 36, 036	12,934 48,072 22,994 36,720
South Atlantic		10, 705	9, 978	10, 409	10, 963	205, 434	190, 679	172, 736	135, 272	194, 965
Kentucky Tennessee Alabama Mississippi Arkansas Louislana Oklahoma Texas	3, 052 3, 044 2, 794 1, 964 2, 010 1, 201 2, 800 4, 131	2, 915 2, 650 1, 765 2, 002 1, 242	2, 848 2, 816 2, 634 1, 999 1, 866 1, 190 3, 070 4, 251	2, 815 2, 788 2, 819 1, 999 1, 776 1, 119 3, 193 4, 634	2,871 2,872 3,101 2,299 1,954 1,287 3,321 5,236	80, 949 68, 522 39, 010 31, 628 34, 733 19, 516 57, 816 82, 719	66, 638 56, 842 30, 475 24, 710 34, 034 21, 114 70, 150 99, 162	28, 923 18, 802 46, 050	39, 032 29, 600 22, 988 8, 347 12, 309 35, 762	43, 414 42, 532 43, 965 20, 592
South Central		21, 375	20, 669	21, 143	22, 941	414, 894	403, 125	366, 908	250, 332	448, 747
Montana Idaho. Wyoming. Colorado. New Mexico Arizona Utah Newada Washington Oregon. California	351 68 178 1,396 196 39 18 2 48 74	167 1,438 199 39 18 2 46 82	134 32 160 1, 533 250 29 15 2 33 63 82	192 1,732	123 42 186 1,836 283 36 16 27 37 62	6, 093 2, 697 3, 253 16, 806 3, 500 1, 048 440 47 1, 684 2, 440 2, 576	5, 206 2, 438 2, 672 18, 694 3, 482 1, 014 522 44 1, 794 2, 952 2, 400	22, 228	1, 330 3, 552 38, 970 3, 598 496 496 46 1, 292 1, 980	1, 722 1, 428 1, 953 19, 278 5, 660 576 320 40 1, 369 1, 860 2, 610
Western		2, 393	2, 333	2, 590	2, 713	40, 585	41, 218	38, 065		36, 816
United States.									2, 060, 185	
				<u> </u>			L		<u> </u>	

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>&</sup>lt;sup>1</sup> Preliminary.

Table 48.—Corn: Yield per acre, average 1919-1928, and annual 1926-1931, and estimated price per bushel December 1, average 1925-1929, and annual 1926-1931, by States

			Yiel	d per	асте			Est	imate	d pri	ce per	bush	el De	 c. 1
State and division	Av- er- age, 1919- 1928	1926	1927	1928	1929	1930	1931	Av- er- age, 1925– 1929	1926	1927	1928	1929	1930	1981
Maine	42.4 43.1	46. 0 41. 0	39. 0 41. 0 38. 0 38. 0 40. 0 89. 5	40. 0 44. 0 39. 0 42. 0 34. 0 38. 5 39. 0	41. 0 39. 0 41. 3 43. 0 81. 1 87. 0	42. 0 30. 0 36. 0 22. 0	46.0 46.0 43.0 43.0 42.0 39.0 41.0	103 122 126 117 96 87 88	Cts. 100 100 95 115 115 86 80 78	Cts. 110 105 105 120 120 120 96 85	Cts. 115 120 110 130 135 130 99 97	Cts. 120 110 105 135 140 110 103 101 100	Ct.s 100 105 100 100 110 90 95	Cts. 70 68 63 60 70 60 52 46
North Atlantic	41.5	89. 9	87.9	37. 9	35.8	27.0	45.6	92. 4	82.7	93. 9	97.7	102, 3	94. 5	51.1
Ohlo Indiana Illinois Michigan Wisconsin Minnesota Iowa Miscouri North Dakota South Dakota Nebraska Kausas	39. 2 36. 3 35. 6 34. 8 39. 7 84. 9 40. 3 28. 6 25. 8 26. 0 21. 1	24 0	32. 5 30. 0 27. 5 30. 5 30. 5 35. 5 29. 0 25. 0 33. 1 30. 0	34. 0 41. 5 29. 0 24. 5	35. 5 25. 0 36. 0 40. 2 23. 5 15. 0 23. 7 25. 5	31.0 34.0 14.0	29. 1 28. 0 23. 5 33. 5 27. 5 18. 5 5. 2	81 78 61 64 74 63 60 66	50 56 73 75 56 56 68 68 68 70	77 68 71 85 84 69 75 62 57 62 61	76 69 70 84 78 62 67 73 61 62 71 65	78 74 72 89 83 65 70 86 68 62 69 74	67 61 62 77 72 53 58 76 53 47 51	34 28 30 40 47 87 35 33 87 41 38
North Central	32, 8	29. 0	31.5	32. 8	30.0	24, 2	26.8	65. 5	59.7	68. 0	69. 3	72. 2	59. 1	33. 9
Delaware. Maryland. Virginia. West Virginia. North Carolina. South Carolina Georgia. Florida.	33. 0 39. 4 26. 8 33. 5 20. 3 15. 1 13. 0 13. 8	31. 0 39. 8 27. 5 33. 0 22. 0 15. 5 14. 5	14.0	33. 0 36. 5 27. 5 36. 0 18. 5 12. 0 10. 5 13. 0	31. 5 24. 2 28. 4 19. 0 14. 5 12. 0	12.0 18.0 14.5	38. 0 28. 2 29. 0 20. 5 14. 3 10. 0	78 96 101 98 99	64 64 85 94 88 90 76 92	80 80 92 100 91 90 81	88 88 100 103 103 106 106	88 88 100 106 100 99 88 85	91 93 105 109 93 90 86 90	40 40 46 52 43 44 46 53
South Atlantic	19.3	20. 5	21.0	17.8	17. 3	13.0	17.8	93, 2	82.4	88, 2	101.0	95. 5	92. 5	44.8
Kentucky Tennessee Alabama Mississippi Arkansas Louislana Oklahoma Texas	26. 9 23. 5 14. 2 16. 2 18. 5 17. 0 20. 8 21. 6	33. 0 27. 5 16. 2 19. 2 20. 5 17. 5 26. 0 27. 8	26. 0 24. 0 16. 0 17. 8 19. 0 17. 5 26. 5 23. 0	14.0 17.0	22. 7 14. 0 17. 7 15. 5 15. 8 15. 0	11, 5 4, 7 11, 0 11, 2	25, 0 14, 0 18, 5 22, 5 16, 0	95 93 91 92 70	65 66 76 82 80 90 56 60	88 83 92 93 87 90 59 65	96 100 110 102 91 94 68 78	91 92 98 93 98 99 99 79	92 93 96 98 96 93 65 73	37 47 80
South Central	20.4	24. 6	22.0	18. 9	17.8	11.8	19.6	82.8	67.5	77.3	88. 2	89. 9	83. 9	36.3
Montana Idaho Wyoming Colorado New Mexico Arizona Utah Nevada Washington Oregon California	88. 8 20. 4 16. 2 18. 4 27. 4 23. 9 25. 1 36. 6 82. 0 33. 5	20. 0 7. 0 20. 0 28. 0 24. 0 35. 0 31. 5	15. 5 15. 0 32. 0 27. 0 25. 0 37. 0 36. 0 32. 0	16. 0 13. 0 17. 5 26. 0 29. 0 22. 0 39. 0 36. 0 32. 0	85. 0 13. 0 14. 5 17. 7 15. 0 31. 0 28. 0 85. 5 32. 0 30. 0	18. 5 22. 5 14. 0 16. 0 31. 0 23. 0 38. 0 33. 0	34. 0 10. 5 20. 0 16. 0 20. 0 37. 0	87 75 70 92 124 107 117 96 100	92 90 72 71 87 120 115 120 95 100	110 115 90 95	125 110 112	84 94 85 75 89 130 100 120 103 98 112	66 70 67 62 77 115 100 115 88 83 87	
Western	19.0	13. 1	19.9	17. 2		21.7			85.8	78. 1	81.2	83. 6	67. 0	46.6
United States	28.2	27.0	28, 1	28.0	25.9	20. 4	24.4	71.3	64.2	72.3	75, 2	77. 4	65. 5	36, 0

Table 49.—Corn: Utilization for grain, silage, hogging down, grazing, and forage, by States, 1930 and 1931

			1930					1331 1		
State and division	For	grain	For	silaga	Hogging down,	For	grain	For	alag-	Hogging
	Acreage	Produc- tion	Acre- age	Produc- tion	grazing and forage acreage	Acre- age	Produc- tion	Acre- aga	Produc-	grazing, and forage acreage
Maine	6	1,000 bushels 84 135 258 450 84 504 3,330 4,810 18,238	1,000 acres 8 8 44 23 5 33 33 317	1,000 short tons 86 84 440 253 50 363 2,814 255 1,902	1,000 acres 3 2 10 6 2 6 105 8 73	1,000 acres 2 3 7 9 1 12 111 134 913	1,990 bushela 84 135 322 387 43 504 4,329 5,628 45,194	1,000 acres 9 3 49 21 5 33 346 29 317	1,990 short tons 92 88 542 235 55 346 3,806 284 3,328	1,700 acres 3 2 9 7 2 6 109 7 38
North Atlantic	1,105	27, 893	807	6, 247	215	1, 192	56, 626	816	8,776	183
Ohio	600 731	76, 460 106, 784 204, 360 14, 400 25, 950 96, 192 333, 948 72, 380 2, 553 59, 874 219, 100 68, 412	234 171 371 330 1,023 484 285 92 68 64 72 831	1, 264 992 2, 412 1, 551 7, 161 8, 436 2, 280 414 238 230 396 1, 258	351 440 601 315 227 1,043 1,228 861 829 1,560 728 972	3, 081 4, 200 8, 404 827 754 3, 116 9, 961 5, 599 168 2, 395 9, 156 5, 511	140, 186 155, 400 810, 943 25, 637 21, 886 74, 784 333, 694 163, 972 3, 276 19, 639 155, 652 99, 198	152 110 230 297 1,095 528 328 55 71 102 108 265	1,444 869 1,725 2,079 7,336 3,432 2,460 344 241 245 454 1,192	343 245 551 283 231 1,252 1,351 530 920 2,340 874 729
North Central	51,794	1, 280, 413	3, 525	21,632	9,155	53, 172	1, 494, 252	3, 341	21,521	9,649
Delaware	1,213 367 2,135 1,493	2, 546 6, 250 13, 343 4, 404 38, 430 21, 648 34, 870 5, 544	3 34 124 31 13 8 7 2	20 170 434 155 72 16 32 12	1 11 161 23 85 35 104 30	142 510 1,427 421 2,244 1,572 3,540 645	4,615 19,380 40,241 12,209 46,002 22,480 35,400 5,482	3 25 55 16 12 3 7 2	26 250 550 152 64 18 38	1 10 45 9 89 33 125 27
South Atlantic	9,742	127, 035	217	911	450	10, 501	185, 809	123	1,109	339
Kentucky Tennessee	2,642 2,720 1,970 1,614 1,090	25, 540 36, 988 28, 560 23, 640 7, 747 11, 990 33, 778 71, 040	30 18 5 2 2 2 2 12 8	105 63 20 7 6 10 41 30	231 128 94 27 160 27 218 186	2, 678 2, 758 3, 060 2, 259 1, 808 1, 261 3, 153 5, 099	74, 984 68, 950 42, 840 41, 792 40, 680 20, 176 50, 448 91, 782	20 18 5 2 2 2 12 8	140 108 25 12 12 6 54 30	173 96 36 38 144 24 156
South Central	19,993	239, 283	79	282	1,071	22, 076	431, 652	69	387	796
Montana Idaho Wyoming Colorado New Mexico Arizona Utah Nevada Washington Oregon California	21 80 1,461 221 22 7 1	192 819 1, 560 33, 603 3, 094 352 224 25 418 840 1, 632	2 5 2 46 3 3 3 1 9 21 21	10 45 16 253 15 21 33 8 86 143 197	128 9 110 225 33 6 6 0 14 15 21	10 26 72 1,461 243 25 7 1 11 25 48	175 910 900 16,071 4,860 400 154 24 407 750 1,584	2 50 2 50 4 4 3 1 10 22 21	10 45 8 200 24 28 24 7 100 143 178	111 10 112 325 36 7 6 0 16 15 21
Western	1,912	42, 759	116	827	562	1,929	26, 235	125	767	659
United States.	04 740	1, 717, 383	4,744	29,899	11, 453	88,870	2, 194, 574	4.474	32, 860	11,626

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>&</sup>lt;sup>1</sup> Preliminary,

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l 1928–29 to 1931–32
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		V	Acreage				Yiel	Yield per acre	9			H	Production		
Country	A verage, 1921–22 to 1925–26	1928-29	1928-29 1929-30	1930-31	-321	A verage, 1921–22 to 1925–26	1928 29	1929-30	1830 31	1931–321	Average, 1921–22 to 1925–26	1928-29	1929-30	1930-31	1931-32 1
North America: Canada. United Ststes. Astron. Gustamala	1,000 acres 293 102,615 7,575 390	1,000 acres 139 100, 673 7, 690 298	1,000 acres 153 97,806 7,080	1,001 acres 100,743 7,508 7,508	1,000 acres 131 104,970 7,939	Bushels 44.3 27.8 11.3 19.9	Bushels 37. 7 28. 0 11. 1 14. 1	Bushels 34.1 25.9 8.2 14.4	Bushels 36, 2 20, 4 7, 1 14, 7	Bushels 41. 4 24. 4 9. 6	1,000 bushels 12,974 2,850,733 85,241 7,772	1,000 bushels 5,241 2,818,901 85,540 4,196	1,000 bushels f, 183 2, 535, 386 57, 824 5, 006	1,010 bushels 5,826 2,060,185 54,200 6,137	1,000 bushels 5, 42b 2, 559, 863 75, 961
Total North Amarican countries reporting area and production, all years. Estimated North American total.	110, 483	108, f02 109, 600	105, 038	108, 502	113, 040	2h. 7	26.8	24.7	19.5	. 183.3 -	2, 948, 948	2, 909, 682	2, 598, 393	2, 120, 211	2, 638, 250
Europe: France. Spain. France.	3, 107 1, 107 1, 107 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2	840 850 866 8,710 143 2,623 5,018 1,010 11,010 11,103	1, 006 1, 006 1, 006 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1	1, 106 1, 106 3, 745 1, 900 1, 938 10, 938 9, 688 10, 938 9, 688	833 1, 052 805 8, 661 148 9, 735 6, 158 11, 749 11, 749 9, 742	7. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2.	42277724244444444444444444444444444444	244 244 244 244 244 244 244 244 244 244	888.588.4884 8.1888.4884 8.1888 8.1888 8.1888 8.1888	88 282828 16829828 16818	75. 23. 33. 35. 35. 35. 35. 35. 35. 35. 35. 3	2, 27, 27, 27, 27, 27, 27, 27, 27, 27, 2	82, 22, 23, 24, 25, 25, 26, 27, 27, 27, 27, 27, 27, 27, 27, 27, 27	22, 023 28, 843 16, 722 118, 736 9, 738 136, 386 137, 930 3, 299	28, 654 28, 654 78, 1197 78, 1197 78, 605 1128, 605 250, 256 28, 256 3,
Total European countries reporting area and production all years	28, 967	26, 492 27, 900	38, 735	27, 751	28, 623	20.1	13.8	83.8	21.2	21.7	481, 691	304, 826	682, 885	586, 962	620, 831
Africa: Morocco Egypt  Retimated African total	437 1, 988 3, 100	2, 131 3, 300	1, 917 4, 200	649 1,896 3,900	837	34.8	11.5 36.8	9.1	9.2	4.4	3, 629 69, 090 83, 000	6, 864 78, 336 102, 000	5, 455 69, 462 108, 000	5, 990 09, 886 96, 000	3, 716

67,418	221,000	್ ್	3, 023, 000		77 111 10 10 10 10 10 10 10 10 10 10 10 10	θ		8
97, 680 62, 554 9, 366 4, 751	216, 000	77.	3, Uax, UUU		2,707 0,241 372,590 56,175 4,643 78,010	220, 960	767, 000	3, 296, 683
88.28.6.8.9.4.4.1.2.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1	205,000	350,	3, 631, 000		173, 878 2, 346 2, 346 22, 082 280, 614 80, 383 6, 847 62, 047 7, 946	434,399	685,000	8, 784, 386 4, 314, 000
90, 240 2, 838 68, 532 3, 190 16, 765	215,000	8, 349, 904	3, 626, 000		188, 891 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2	395, 072	675,000	3,744,976
82, 482 3, 655 51, 167 2, 829 2, 771 16, 661	187,000	3, 485, 435	3, 738, 000		177, 338 1,468 1,409 227, 393 56, 890 67, 973 8, 641	352, 722	569,000	3, 888, 157
27.6		23.0			16.4			
15.0 29.2 12.8 11.6		20.0			29.4 12.9 17.0 16.9	<u>8</u> ,	-	20. 5
23.7 28.3 12.4 11.15		24. 5			26.9 26.9 12.8 21.5 14.7 7.7 7.7	18.9	-	23.9
13.4 23.5 12.5 21.4 13.1		24.3				19.9	-	E. 7
13.9 25.9 37.2 17.2 17.1		25. 6			22.00.00 20.	20.4	-	25.0
2,441	11,700	14 1, 941	160, 200		4,688		32, 700	192, 900
6, 530 2, 139 2, 263 1, 277	12, 100	139, 041	164, 800		92 452 11, 315 4, 371 4, 915	21, 448	32, 400	160, 489
6, 641 2, 236 2, 236 220 220 1, 273	12,300	136, 609	162, 900		94 452 10,428 6,290 4,214 298	21, 796	33, 600	158, 406 186, 600
6,731 2,428 2,256 203 1,284	12,300	138, 021	163, 100		12, 192 116 437 9, 026 5, 370 8, 370 4, 603	19,876	36, 300	157, 897
5, 937 141 1, 467 231 162 1, 338	10, 600	136, 334	150,700		6, 88, 470 88, 88, 88, 88, 88, 88, 88, 88, 88, 88	17, 256	26, 100	153, 590
Asis: Indis Japan Mauchuris Oncsen Kwantung Pulippinss	Estimated Asiatic total	Total Northern Hemisphere countries reporting area and production, all years Bathmated Northern Hemisphere total, excluding	Kussis	BOUTHERN HEMISPHERE	Brazil Chile Chile Cragatina Argentina Union of South Africa. Southern Rhodesia Jaya and Madura	Total Southern Hemisphere countries reporting area and production, all years through 1890-811.	sphere total	Total Northern and South- ern Hemisphere countries reporting area and pro- duction, all years through 1890-31

Bureau of Agricultural Reonomics. Official sources and International Institute of Agriculture. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere which furnediately follow; thus for 1930-31 the crop harvested to the Northern Hemisphere countries in 1930 is combined with the Routhern harvest which takes place early in 1931.

1 Preliminary.

2 2-year average.

3 3-year average.

4 Аггеаде зожи.

Table 51 .- Corn: World production, 1900-01 to 1931-3

	Esti-	Esti- mated			Sele	cted coun	tries		
Crop year	mated world produc- tion, ex- cluding Russia	Euro- pean produc- tion, ex- cluding Russia	United States	Argen- tina	Ruma- nia	Italy	Brazil	Yugo- slavia	Russia 1
1900-01- 1901-02- 1902-03- 1903-04- 1904-05- 1905-06- 1906-07- 1907-08- 1908-09- 1909-10- 1910-11- 1911-12- 1912-13- 1913-14- 1915-16- 1916-17- 1917-18- 1918-19- 1918-19- 1919-20- 1920-21- 1920-21- 1921-22- 1922-23- 1923-24- 1924-25- 1928-27- 1927-28- 1928-29- 1929-30- 1930-31- 1931-32 6	3, 686 3, 505 3, 904 4, 905 3, 781 3, 789 3, 944 4, 152 3, 895 4, 152 3, 895 4, 152 3, 777 4, 178 4, 178 4, 178 4, 181 4, 181 4, 181 4, 181 4, 311	Nullion bushels 445 447 391 459 279 454 465 502 547 576 559 351 299 454 469 589 626 653 484 705 610 643	Mulion bushels 2, 505 1, 614 2, 619 2, 347 2, 529 2, 898 2, 512 5, 582 2, 581 3, 125 2, 447 2, 503 2, 503 2, 503 2, 503 2, 503 2, 503 2, 503 2, 503 2, 505 2, 503 2, 505 2, 503 2, 505 2	Million bushels 99 84 149 175 141 196 6 177 175 28 8 296 197 263 325 161 59 171 224 259 230 176 277 186 322 321 312 240 281 373	Million bushels 85 117 88 80 20 59 131 58 79 70 104 111 103 86	Million bushels 88 100 97 93 88 96 102 101 111 105 122 83 777 86 101 118 87 76 65 100 118 78	Million bushels	Affilian bushels 18 19 9 9 21 28 18 21 34 227	Multion bushels 849 851 266 849 92 644 855 102 94 82 90 872 72 462 864 868 867 911 172 131 1127 158

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus for 1930-31 the crop harvested in Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which takes place early in 1931.

5 Production in present boundaries beginning this year, therefore not comparable with earlier years.
5 Preliminary.

<sup>&</sup>lt;sup>1</sup>Includes all Russian territory reporting for the years shown.

<sup>1</sup>Total Russian Empire exclusive of the 10 Vistula Provinces of Russian Poland and the Province of Batum in Transcaucasia.

\* Exclusive of Russian Poland, Lithuania, parts of present Latvin and the Ukraine, and the Provinces of Batum and Elizabetpol in Transcaucasia.

Beginning this year, estimates within present boundaries of the Union of Socialist Soviet Republics, exclusive of Turkestan, Transcaucasia, and the Far East, which territory in 1924-25 produced 26,048,000 bushels.

Table 52.—Corn: Monthly marketings, by farmers, as reported by about 3 500 mills and elevators, United States, 1921-22 to 1930-31

					Perc	entage	of yea	r's rec	eip's				
Crop year	Oct.	Nov.	Dec.	Jan	Feb.	Mar.	Apr.	Мау	June	July	Aug.	-epr	793.
1921-22 1922-23 1923-24 1924-25 1925-26 1926-27 1927-28 1928-29 1929-30 1930-31	6.7 8.2 5.6 7.0 5.9 10.1 6.2 6.6 6.9 7.5	6. 6 8. 7 10. 4 11. 1 9. 3 9. 1 8. 6 12. 5 9. 3 9. 3	12.4 13.6 12.3 13.0 14.6 12.9 15.5 16.7 13.4 13.0	13. 9 10.7 12. 9 13. 6 12. 1 11. 7 13. 8 12. 9 10. 9	12. 4 11. 0 13. 3 9 5 10. 4 10 8 11. 7 11. 5 10. 6 9. 9	7.56 7.44 8.59 8.9 7.44 8.2	4.7 5.3 6.3 6.3 5.8 5.4 8.7.7	7. 6. 1 5. 9 7. 8 7. 1 6. 6 4. 3 6. 9 5. 5	7.5 6.4 6.3 5.2 9.1 5.4 7.3 6.3 7.5	4.9 6.8 6.6 5.1 5.7 5.8 6.6 7.4	7.7.7.6.7.6.6.5.5.6.5.6.5.7.8.	9.1 6.5 6.6 6.3 5.4	100, 0 100, 0 100, 0 100, 0 100, 0 100, 0 100, 0 100, 0 100, 0

Bureau of Agricultural Economics.

Table 53.—Coin: Receipts at primary markets, 1921-22 to 1930-31

Year beginning November	Chicago	St. Louis	Kansas City	Peoria	Omaha	Indian- apolis	Total 10 markets 1
1921-22	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush. 31, 115 22, 308 27, 679 13, 345 20, 076 20, 482 31, 019 10, 276 24, 795 17, 488	1,000 bush.	1,000 bush.
1922-23	187, 884	84, 055	16, 081	24, 960		21, 291	375, 409
1923-24	118, 711	30, 263	15, 598	21, 284		18, 839	253, 590
1924-25	101, 200	39, 289	21, 105	17, 744		17, 728	274, 128
1925-26	80, 700	23, 185	21, 470	21, 234		17, 613	202, 504
1926-27	92, 283	27, 952	18, 643	26, 678		18, 363	226, 192
1927-28	91, 880	21, 039	14, 767	23, 292		19, 977	217, 881
1922-29	105, 134	34, 943	47, 603	23, 434		22, 712	290, 492
1929-29	05, 090	38, 517	34, 536	27, 390		25, 519	288, 600
1929-30	77, 394	23, 383	29, 079	23, 088		23, 757	231, 390
1930-31 <sup>1</sup>	59, 365	13, 014	25, 929	8, 842		21, 925	170, 039

Bureau of Agricultural Economics. Compiled from reports of Chicago Board of Trade, Duluth Board of Trade, Indianapolis Board of Trade, Kansas City Board of Trade, Omaha Grain Exchange, St. Louis Merchants Exchange, Milwaukee Chamber of Commerce, Minneapolis Chamber of Commerce, and Grain and Feed Journal.

ABLE 54.—Shelled corn: Classification of receipts graded by licensed inspecto all inspection points, total of all classes under each grade, 1917-18 to 1930-31

Year beginning				Gra	ade			
November	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	Sample	Total
1917-18	Cars 2, 281 12, 661 128, 517 68, 550 30, 970 21, 580 3, 038 7, 883 1, 616 9, 682 25, 809 26, 394 18, 176	Curs 18, 714 34, 727 47, 961 88, 875 197, 254 141, 563 59, 582 80, 883 59, 985 34, 390 87, 801 92, 258 85, 088 67, 781	Curs 58, 562 40, 872 38, 774 64, 237 115, 207 98, 932 111, 932 56, 757 57, 931 78, 352 78, 331 49, 806 70, 928	Cure 56, 249 41, 491 56, 847 687 687 682 24, 282 69, 385 24, 387 47, 890 50, 516 45, 629	Curs 45, 610 28, 832 27, 313 21, 176 21, 983 4, 905 31, 370 48, 348 50, 195 34, 638 40, 594 39, 995 14, 745	Cars 44, 621 16, 061 9, 188 9, 420 15, 979 3, 526 15, 410 17, 252 40, 116 46, 180 27, 553 10, 400 19, 475 5, 262	Curs 98, 844 19, 638 13, 058 8, 738 4, 951 10, 742 12, 345 31, 171 29, 006 7, 227 16, 580 3, 745	Cure 324, 872 194, 262 221, 458 324, 977 428, 204 297, 844 240, 706 297, 129 269, 700 314, 932 343, 933 3288, 204 226, 266

<sup>&</sup>lt;sup>1</sup> Includes also Milwaukee, Minneapolis, Duluth, and Toledo.

<sup>&</sup>lt;sup>2</sup> Preliminary.

Table 55 .- Corn: Visible supply in United States, 1922-23 to 1931-5

('rop year	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
1922-23_ 1923-24 1924-25_ 1925-26_ 1925-27_ 1927-28_ 1928-29_ 1929-30_ 1930-81_ 1931-32_	1,000 bushels 8,806 8,097 1,790 22,258 20,574 2,030 3,237 4,379 7,217	11, 072 2, 690 7, 563 2, 461 28, 699 19, 216 6, 419 3, 267 6, 964	8, 799 18, 573 17, 861 34, 712 27, 034 17, 146 9, 892 16, 390	21, 658 9, 379 27, 571 28, 092 38, 792 31, 849 26, 042 15, 215	bushels 27, 529 18, 898 32, 292 33, 878 45, 103 40, 998 33, 302 22, 667	28, 742 26, 074 32, 727 30, 485 47, 244 43, 856 34, 150 23, 532	bushels 22, 339 17, 978 23, 379 32, 408 36, 621 33, 556 25, 687 19, 986	6, 734 12, 288 17, 140 25, 453 29, 961 25, 496 14, 259 10, 825	3, 366 8, 279 13, 094 30, 333 34, 427 16, 008 13, 054 6, 825	2, 373 4, 887 6, 093 24, 930 30, 205 13, 267 8, 751 3, 656	1, 587 5, 070 6, 524 19, 771 22, 312 9, 516 5, 417	2,052 7,154 5,470 17,381 23,687

Bureau of Agricultural Economics. Compiled from the Chicago Daily Trade Bulletin.

TABLE 56.—Corn: Commercial stocks in store, 1926-27 to 1930-31

DOMESTIC CORN IN UNITED STATES 1

Crop year	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
1926-27	1,000 bushels 21,661 2,032 3,639 4,550 7,341	2,982	36, 019 28, 741 18, 565 8, 228 17, 190	40, 670 30, 717 28, 797 16, 079	47, 515 44, 786 36, 927 24, 944	49, 759 48, 273 37, 744 25, 671	89, 010 36, 835 28, 863 21, 073	31, 224 27, 497 15, 951	36, 268 17, 650 13, 740	31, 782 12, 304 9, 086 3, 421	9, 768 6, 340	24, 913 6, 894 4, 421

#### UNITED STATES CORN IN CANADA

1926-27. 1927-28. 1928-29. 1928-29. 1928-29. 1928-30. 1930-31. 1930-31. 1931-32. 1,143. 1,145.	580 737 253 180 571 481	1,312 976 601 356	1,781 1,452 626 1,634 1,759 1,602 428 745 476 995	1, 184 1, 706 1, 337 818 911 746 697 135 176 195	510 534 480 987 147 928
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Bureau of Agricultural Economics. Compiled from weekly reports to the grain, hay, and feed market news service. Data are for stocks on the Saturday nearest the 1st day of the month.

Table 57.—Corn Estimated average price per bushel, received by producers, United States, 1922-23 to 1931-32

Crop year	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	Мау 15	June 15	July 15	Aug. 15	Sept.	Weighted average
1922-23 1922-24 1924-25 1925-26 1928-27 1927-28 1929-29 1929-30 1930-31 1931-32	Cents 62, 2 84, 8 108, 9 83, 0 74, 5 87, 6 84, 7 91, 9 81, 9 33, 4	Cents 64, 3 78, 3 78, 3 99, 6 74, 6 66, 0 73, 7 75, 4 81, 0 66, 3 36, 6	Cents 67. 6 72. 2 105. 6 70. 7 64. 5 75. 1 76. 1 78. 0 64. 9 34. 5	Cente 70. 2 73. 6 112. 0 69. 6 64. 3 75. 2 80. 2 77. 3 61. 7	Cents 72. 5 76. 5 114. 5 68. 5 79. 0 86. 8 77. 4 58. 6	75.3 77.2	79. 6 78. 2 103. 8 65. 7 65. 6	84. 0 78. 6 107. 5 67. 1 73. 0	85. 8 80. 8 111, 0 68. 6 88. 9		87. 0	Cente 86, 2 109, 7 98, 8 76, 2 95, 3 95, 1 97, 2 91, 7 43, 2	Cenis 75. 0 82. 3 107. 3 71. 4 74. 1 85. 3 84. 5 80. 9 59. 5

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by monthly marketings. Mean of prices reported on 1st of month and 1st of succeeding month, October, 1922–December, 1923.

<sup>1</sup> Saturday nearest the 1st of each month.

<sup>&</sup>lt;sup>1</sup> Includes corn in store in public and private elevators in 42 important markets and also the corn afloat in vessels or barges in the harbors of lake and seaboard ports. Corn in transit either by rail or water, mill stocks, or small private stocks of corn intended only for local purposes, not included.

Table 58.—Corn, including cornmeal in terms of grain: International trade, average 1925-26 to 1929-30, annual 1927-28 to 1930-31

				Y	ear begin	ining Ju	ly			
Country	Average to 19		1927	7-28	1929	-29	1929	-30	1930-	-31 •
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES  Argentina Rumania United States Uniton of South Africa Vugoslavia Russia Duth East Indies 6. Hungary Bulgaria Indo-China Egypt China 6.	30, 906 23, 233 19, 446 4 8, 534 5 5, 673 4, 876 4, 043 3, 828 3, 554 1, 786	0	1,000 bushels 279,455 38,503 19,409 17,843 671 981 3,054 2,366 2,979 5,859 1,059	1,000 bushels 0 (3) 5,463 300 	1,000 bushel s 243, 424 3 3, 712 41, 874 18, 769 534 8, 500 2, 000 4 4, 363 2, 761 945 29	1,000 bushels 0 (1) 490 129 	1,000 bushels 163,535 331,030 10,231 18,381 18,436 6,100 5,610 2 6,400 77 2,022 6	1,000 bushels 0 (3) 196 52 	1,000 bushels 274,027 3,318 23,547 	1,000 bushels 0 1,747 30 
Total	327, 734	2, 831	375, 693	6, 494	327, 713	1,789	272, 749	998	320, 075	5, 344
PRINCIPAL IMPORT- ING COUNTRIES										
United Kingdom Netherlands Germany France Belgium Italy Denmark Irish Free State Canada Spain Czechoslovakia Austria Sweden Switzerland Norway Cuba Mexico 4 Poland Japan Greece Australia Tunis Uruguay Algeria Finland Estonia	738 239 1,080 422 0 124 58 88 0 5 20 0 0 43 222 0 91 177 561 14	71, 650 44, 523 42, 826 247, 349 24, 268 23, 942 23, 942 23, 645 13, 003 12, 038 6, 593 6, 5112 5, 599 4, 588 42, 315 2, 108 2,	2,552 729 4 32 1,121 24 4 0 152 141 0 0 8 8 13 	75, 705 53, 234 72, 050 25, 594 27, 317 29, 727 16, 847 113, 930 6, 136 7, 752 5, 459 5, 176 2, 068 1, 119 3, 017 1, 119 3, 017 1, 143 1, 143 1, 143 2, 206 206 23	2,308 717 5 21 1,096 16 0 142 98 0 1 21 0 0 0 272 272 2,364 9 0 0	71, 672 41, 471 32, 915 30, 771 22, 630 40, 971 14, 853 17, 536 14, 816 10, 579 5, 338 6, 533 6, 533 6, 1, 155 22 1, 144 1, 145 22 274 106 106 293 292	2, 313 1, 067 2 89 1, 023 268 0 61 34 0 0 2 30 0 0 0 33 30 13 394 11 1 0 0	68, 763 41, 798 31, 578 329, 929 221, 895 27, 240 9, 874 10, 607 14, 010 9, 915 9, 035 7, 160 3, 853 4, 575	0	83, 605 48, 785 17, 320) 30, 757 27, 232 25, 257 14, 856 20, 672 9, 819 16, 868 8, 214 8, 146 5, 202 6, 101 3, 122 2, 776 647  846 0
Total	5,379	340, 442	4, 856	398, 439	7, 107	336, 959	5, 076	304, 481	5, 329	337, 100

Bureau of Agricultural Economics, official sources except where otherwise noted. Maicana or maizana is included with "corn and corn me.l."

<sup>1</sup> Preliminary.
2 I year only.
3 Monthly Crop Report and Agricultural Statistics.
44-year average.
3-year average.
6 Calendar year.

Table 59.—Corn, No. 3, yellow: Weighted average price 1 per bushel of reported cash sales, Chicago, 1899-1900 to 1931-32

Crop year	Nov.	Dec.	Jan.	Feb.	Mør.	Apr.	Мау	June	July	Aug.	Sept.	Oct.	Weight- ed aver- age
1899-1900 1900-01	Cents 31 37	Cents 30 35	30 36	Cents 32 37	36 39	Cents 39 42	Cents 38 43	Cents 40 42	Cents 41 48	Cents 40 56	Cents 40 56	Cents 42 56	Cents 36 43
1901-02 1902-03 1903-04	60 53 44	64 46 44	62 43 43	59 43 46	59 41 46	62 41 49	62 46 49	63 49 50	65 51 49	60 53 52	59 51 53	60 45 55	62 47 49
1904-05 1905-06 1906-07	48 45 43	43 42 42	42 42 41	44 42 48	47 40 43 63	48 42 44	50 47 52 78	55 49 53 72	57 52 54 76	54 54 57 81	53 47 64 80	53 46 65 77	48 44 50
1907-08 1908-09 1909-10 1910-11	59 63 59 49	58 59 59 45	53 64 64 45	54 65 63 45	66 61 45	65 69 57 50	73 60 54	75 59 55	72 62 63	70 64 65	69 58 67	59 50 73	65 59
1910-11 1911-12 1912-13 1913-14	68 52 72	61 46 68	62 46 62	64 48 62	68 49 64	78 55 67	79 57 70	75 60 72	68 62 71	79 74 82	74 75 79	65 70 73	43 62 47 49 48 44 50 65 65 59 53 71
1914-15	67 63 98	64 69 92	71 74 98	74 74 100	72 73 109	75 76 140	77 75 159	74 74 170	78 81 199	81 85 206	74 86 210	65 96 203	70 79 111
1916-17 1917-18 1918-19 1919-20	221 133 146	177 145 147	177 143 151	181 127 146	170 153 158	165 162 169	160 174 202	162 178 189	170 192 158	172 195 158	158 155 131	141 141 91	163 162 159
1920-21 1921-22 1922-23	77 47 71	75 47 73	65 48 70	63 55 72	62 57 73	57 58 79	60 62 82	63 61 84	60 64 88	56 62 88	53 64 89	45 69 104	62 55 73 88
1923-24 1924-25 1925-26 1926-27	82 111 83 71	71 120 76 75	76 124 79 74	78 122 75 73	77 117 72 68	77 105 71 71	77 115 71 87	82 113 70 99	109 108 78 102	117 102 80 109	91 79 97	110 82 77	88 106 75 87
1926-27 1927-28 1928-29 1929-30	84 84 88	86 83 88	89 93 85	95 94 82	99 94 80	106 90 82	108 87 79	103 91 79	106 99 82	102 101 99	100 101 94	84 96 95 82	101 92 83
1930-31 1931-32	71 43	69 37	65	61	60	58	56	58	57	46	42	38	60

Bureau of Agricultural Economics. Compiled from Chicago Daily Trade Bulletin.

Table 60.—Corn: Weighted average price 1 per bushel of reported cash sales of all classes and grades, six markets 2 combined, 1921-22 to 1931-32

Стор уеаг	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Weight- ed aver- age
1921-22 1922-23 1923-24 1924-25 1924-25 1925-26 1926-27 1927-28 1928-29 1928-30 1930-31	Cents 45.6 70.8 74.9 108.3 71.0 67.3 79.8 81.0 67.8 43.5	45. 7 71. 6 67. 5 114. 4 68. 3 65. 9 77. 0 78. 4 79. 1 64. 1	46.0 69.2 72.8 112.9 69.5 65.2 78.6	53. 8 71. 6 73. 7 103. 6 63. 2 62. 7 84. 1 89. 5 75. 9	55. 4 72. 4 72. 7 103. 5 64. 6 60. 9 89. 6 89. 0	56. 5 79. 0 74. 7 99. 0 66. 4 67. 0 98. 2 86. 9	82 1 75. 4 111. 9 68. 0 83. 0 104. 0 84. 6 78. 5	59. 3 83. 1 82. 7 109. 7 66. 9 91. 5 100. 8 89. 7 77. 8	62, 1 85, 6 106, 6 105, 3 76, 3 96, 7 102, 7 98, 1 80, 6	60. 1 86. 4 114. 4 101. 3 78. 3 104. 2 96. 8 99. 9 97. 6	62.3 88.8 113.7 89.1 76.5 92.2 97.5 100.0 93.2	69. 4 100. 3 109. 2 80. 8 73. 2 79. 9 89. 3 93. 8 80. 3	55. 7 77. 4 83. 0 106. 0 69. 0 75. 8 89. 2 88. 5

Bureau of Agricultural Economics. Compiled from Chicago Daily Trade Bulletin, St. Louis Daily Market Reporter, Omaha Daily Price Current, Kansas City Grain Market Review, Minneapolis Daily Market Record, Cincinnati Daily Trade Bulletin. The prices in this table are comparable with prices paid to producers in that the latter are averages of the several prices reported which cover all classes and grades sold by producers.

<sup>1</sup> Average of dally prices weighted by car-lot sales.

<sup>&</sup>lt;sup>1</sup>Average of daily prices weighted by car-lot sales.

<sup>1</sup>Markets are Chicago, St. Louis, Omaha, Kansas City, Minneapolis, and Cincinnati (not included November, 1928-December, 1931).

Table 61.—Corn, yellow, La Plata: Spot price per bushel of 56 pounds at Liverpool and Buenos Aires 1921-22 to 1931-32

### LIVERPOOL

Crop year	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Aver- age
1921-22- 1922-23- 1923-24- 1924-25- 1926-27- 1927-28- 1928-29- 1929-30- 1930-31- 1931-32-	Cents 78 96 96 121 107 95 97 123 99 52 44	Cents 88 100 102 122 110 92 104 120 89 54 37	Cents 92 99 103 131 97 89 110 124 84 48	Cents 104 115 129 91 93 119 127 79 19	Cents 105 105 111 114 89 87 127 124 75 58	Cents 103 109 107 111 94 88 129 120 91 62	Cents 106 114 112 130 89 91 127 107 \$5	Cents 101 110 100 12s 57 93 125 104 76 50	Cents 110 102 94 127 100 91 123 118	Cents 110 94 104 138 98 98 119 113 90 41	Cents 109 98 114 120 90 97 107 107 77 41	Cenis 108 97 124 103 93 96 116 103 62 40	Cents 102 102 107 123 95 93 117 116 83 50

#### BUENOS AIRES

Bureau of Agricultural Economics. Compiled from International Yearbook of Agricultural Statistics, 1921; subsequently Broomhall's Corn Trade News and Review of the River Plate. Average of weekly quotations. Conversions of Liverpool prices at monthly average rate of exchange as given in Federal Reserve Bulletins to December, 1925, inclusive, subsequently at par of exchange, except that, beginning with September, 1931, the monthly average of current rates of exchange was used. Buenos Aires priceare averages of weekly quotations, converted at monthly average rate of exchange as given in the Federal Reserve Bulletin.

Table 62.—Corn: Volume of trading in futures, contract markets, by markets and by months, 1930-31

Month	Chicago Board of Trade	Chicago Open Board	Kansas City	St. Louis	Mil- waukee	Minne- apolis
November December January February March April May June July August September October	1,000,000 bushels 381 582 427 330 342 317 244 221 229	1,000,000 bushels 10 28 20 17 11 10 8 13 14 8 8	1,000,000 bushels 24 21 27 21 18 23 17 10 13 12 7	1,000,000 bushels	1,000,000 bushels 2 4 3 3 2 2 2 2 2 2 1 1	1,000,000 bushels 
Total	4, 318	173	210	4	24	10

Grain Futures Administration.

Table 63.—Corn: Volume of trading in futures on the Chicago Board of Trade by crop years, 1921-22 to 1930-31

Crop year	Quantity	Стор усаг	Quantity	Crop year	Quantity
1921-22 1922-23 1923-24 1924-25	bushels 4, 180, 000, 000 4, 535, 000, 000 5, 202, 000, 000 6, 363, 000, 600	1925-26	bushels 3, 863, 000, 000 5, 982, 000, 000 6, 589, 000, 000 4, 924, 000, 000	1929-30 1930-31	bushels 3, 799, 000, 000 4, 318, 000, 090

Grain Futures Administration.

Table 64 .- Corn: Volume of trading in futures in all contract markets, by months. 1923-24 to 1930-31

Months	1923-24	1924-25	1925-26	1926-27	1927-25	1028-29	1929-30	1980-31
November	1,000,000 bushels 394 285 457 338 442 323 328 426 565 740 695 678	1,000,000 bushels 557 707 677 810 670 510 566 463 394 442 335	1,000,000 bushels 317 514 302 236 317 292 237 343 448 439 368 340	1,000,000 bushels 353 395 261 288 429 313 692 921 575 713 836 588	1,000,000 bushels 473 681 511 698 733 745 699 567 553 616 372 467	1,000,000 bushels 457 420 690 373 416 466 526 475 520 453 296 269	1,000,000 bushels 261 199 196 252 328 283 283 220 322 498 611 433 461	1,000,000 bushels 418 649 600 474 370 380 346 265 381 373 238 246
Total	5, 631	6, 841	4, 153	6, 394	7, 115	5, 361	4, 134	4, 740

Grain Futures Administration.

TABLE 65.—Oats: Acreage, production, value, exports, etc., United States, 1900-1931

		1		Price per bushel	Farm	Price per bushel	Foreign ye	trade, : ar begin	including ning July	7 2
Year	Acreage har- vested	Average yield per acre	Produc- tion	re- ceived by pro- ducers Dec 1.	value, basis Dec. 1. farm price	at Chi- cago, year begin- ning Aug. 11	Domes- tic exports	Im- ports	Total	Per centage of production
1900 1901 1902 1903 1904 1905 1906 1907 1908	1,000 acres 30, 290 29, 894 30, 578 30, 866 31, 353 32, 072 33, 353 33, 641 34, 006 35, 159	Bushels of 52 lbs. 30. 2 26. 0 34. 5 28. 2 32. 2 34. 0 31. 0 23. 9 25. 0 28. 6	1,000 bushels 913,500 778,392 1,053,489 869,350 1,008,931 1,090,236 1,035,576 805,108 850,540 1,007,145	Cents 25. 4 39. 7 30. 6 34. 0 31. 1 28. 9 31. 9 44. 5 47. 3	1,000 dollars 232, 074 308, 796 322, 423 295, 232 313, 488 314, 868 329, 853 858, 421 402, 010	Cents 26 48 34 38 32 31 37 50 52	1,000 bushels 42,269 13,278 8,382 1,961 8,395 48,435 6,386 2,519 2,334	1,000 bushels 32 39 150 184 56 40 91 383 6,692	1,000 bushels 42,237 13,240 8,233 1,857 8,339 48,395 6,379 2,195 4,252	Percent 4.6 1.7 .8 .2 .8 4.4 .6 .3
1909 1910 1911 1912 1913 1914 1915 1916 1917 1918	35, 159 37, 548 37, 763 37, 917 38, 399 38, 442 40, 996 41, 527 43, 553 44, 349 57, 991	30. 4 31. 6 24. 4 37. 4 29. 2 29. 7 37. 8 30. 1 36. 6 37. 8	1, 063, 289 1, 186, 341 922, 298 1, 418, 337 1, 121, 768 1, 141, 060 1, 549, 030 1, 251, 837 1, 592, 740 1, 538, 124 1, 055, 183	40.6 34.4 45.0 31.9 39.2 43.8 36.1 52.4 66.6 70.9	433, 869 408, 388 414, 663 452, 469 439, 596 499, 431 559, 506 655, 928 1, 061, 474 1, 090, 322	42 33 50 35 40 50 41 54 71	2, 549 3, 846 2, 678 36, 455 2, 749 100, 609 98, 960 95, 106 125, 091 109, 005	1, 063 140 2, 660 765 22, 333 670 720 841 2, 915 838	1, 704 3, 707 30 35, 695 18, 853 100, 158 98, 648 94, 348 122, 273 108, 167	.2 .3 (5) 2.5 8.8 6.4 7.5 7.7 7.0
1919 1920 1921 1922 1923 1924	39, 599 42, 726 45, 537 40, 324 40, 245 57, 650	27. 9 33. 8 23. 0 28. 5 30. 5	1, 106, 426 1, 445, 936 1, 045, 174 1, 147, 720 1, 227, 139 1, 304, 599	70. 2 45. 6 29. 8 39. 0 40. 8	777, 064 658, 737 311, 268 447, 277 500, 282	80 51 35 41 45	48, 436 9, 391 21, 237 25, 413 8, 796	6, 077 3, 827 1, 824 340 4, 271	37, 365 5, 831 19, 422 25, 087 4, 550	3, 4 1, 8 2, 2
1924 1925 1926 1927 1928 1929 1930	41, 811 44, 250 42, 861 40, 326 40, 079 88, 148 39, 729 39, 722	34. 0 31. 9 26. 6 27. 1 32. 9 29. 3 32. 2	1, 423, 317 1, 410, 184 1, 141, 945 1, 092, 550 1, 317, 640 1, 118, 414 1, 277, 764	47. 6 37. 4 39. 2 44. 3 40. 3 42. 6 31. 5 23. 1	677, 550 527, 847 447, 710 484, 253 530, 587 475, 998 402, 713 256, 483	50 41 43 55 44 44 35	16, 777 89, 687 15, 041 9, 828 16, 251 7, 966 3, 123	3, 067 212 135 233 426 175 659	13, 926 39, 565 14, 988 9, 611 15, 825 7, 791 2, 464	1.0 2.8 1.3 .9 1.2 .7

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board, revised, 1919 to 1928. See introductory text; italic figures are census returns. See 1927 Yearbook, p. 788, for data for earlier years.

<sup>1</sup>From Chicago Daily Trade Bulletin, averages of the daily cash quotations of No. 3 white oats weighted

Preliminary,

<sup>1</sup>From Chicago Daily Trade Bulletin, averages of the Gally Coal Management of the United States, 1900–1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June Issues, 1919–1926; January and June Issues, 1927–1931; and official records of the Bureau of Foreign and Domestic Commerce. Oats—general imports, 1900–1931; oatmeal—general imports, 1900–1909; imports for consumption, 1910–1931.

3 Total exports (domestic plus foreign) minus total imports.

4 Net imports. Total imports minus total exports (domestic plus foreign).

Table 66.—Oats: Acreage harvested and production, by States, average 1924-1928, annual 1928-1931

i		Acrea	ge harv	ested			P	roduction	ı	
State and division	Aver- age, 1924- 1928	1928	1929	1930	1931 1	Aver- age, 1924- 1928	192%	1629	1980	19311
Maine New Hampshire Vermont Massachusetts Rhode Island	71;	1,000 acres 114 8 58 5	1,000 acres 120 7 55 4	1,000 acres 120 6 56 5	1,000 acres 118 6 61 4	1,000 bushels 4,646 394 2,217 236 71	1,066 bushels 3,876 312 1,595 160	1,000 bushels 4,548 280 1,705 120	1,000 bushels 4,740 264 1,848 170	1,000 bushels 3,776 228 1,952 132 62
Rhode Island Connecticut New York New Jersey Pennsylvania	930 46 1, 025	8 872 43 971	2 7 800 38 909	872 40 94.5	8 863 43 954	813 29, 987 1, 262 32, 582	196, 26, 596 1, 118 28, 159	210 19,600 988 24,088	256 34,880 1,360 32,602	232 24, 596 1, 333 28, 143
North Atlantic_	2, 226	2, 081	1, 942	2, 054	2, 059	71,658	62,068	51, 609	76, 190	60, 454
Ohio Indiana Illinois Michigan Wisconsin Minnesota Iowa Missouri North Dakota South Dakota Nebraska Nebraska	1,998 4,477 1,537 2,537 4,466 6,188 1,727 2,191 2,611 2,514	2, 374 2, 337 4, 489 1, 534 2, 495 4, 089 6, 150 1, 593 1, 886 2, 360 2, 392 1, 249	1,628 1,872 4,064 1,265 2,436 4,230 6,043 1,404 1,923 2,385 2,480 1,150	1,726 1,986 4,267 1,354 2,435 4,442 6,303 1,727 1,827 2,385 2,485 1,334	1,657 1,966 4,182 1,435 2,459 4,575 6,026 1,865 1,498 1,745 2,311 1,494	75, 086 62, 818 144, 486 51, 200 94, 993 153, 293 223, 326 34, 160 54, 599 72, 267 65, 398 30, 487	87, 838 86, 469 168, 338 51, 389 94, 160 236, 160 38, 232 53, 751 63, 752 31, 725	47, 212 53, 352 136, 144 35, 546 77, 920 145, 935 215, 131 26, 676 34, 614 65, 588 76, 880 24, 150	48, 744 97, 400 166, 575 233, 211 41, 448 40, 194 70, 358 72, 065	49,686
North Central.		32, 948	30, 879	32, 251		1, 062, 113	1, 129, 352	939, 148	1,068,971	868, 086
Delaware	147 153 184 357 285	3 55 137 139 147 299 212 9	2 47 127 140 168 358 289 8	152 140 186 344 246	148 197 378	5,028	3, 684 2, 352 6, 578	2, 642 3, 374 3, 192 8, 485 5, 809	1,470 2,630 2,660 3,534 7,912 5,043	2, 010 4, 838 3, 552 4, 531 9, 450 7, 968
South Atlantic	1, 191	1,001	1, 139	1, 128	1,323	23, 591	21, 472	24, 987	23, 471	32, 616
Kentucky	144 97 38 161 14 1, 160	26 94 15	98 34 92 16 908	90 20 94 13 1,053	138 153 50 160 26	707 2,889	1, 683 928 520 1, 786 368 21, 472	1, 451 1, 960 748 1, 748 400	1,499 1,440 360 1,739	2,760 3,360 1,325 4,160
South Central		2,642	2,779	2, 938	-	-	56, 747	60, 631	66,978	120, 419
Montana Idaho Wyoming Colorado New Mexico Arizona Utah Nevada Washington Oragon California	137 139 203 40 111 51 278	127 147 183 30 47 2 155 258	140 163 203 31 49 247 253	183 144 193 34 10 46 246	183 116 98 148 38 12 43 223 67	13, 552 4, 632 3, 818 5, 506 7,82 309 1, 811 7, 566 7, 879 2, 696	12, 702 4, 699 3, 969 5, 490 600 297 1, 762 7, 592 7, 843	4, 830 4, 042 5, 887 676 171 1, 877	4,921 3,150 6,041 5 71 300 7 1,840 101 7,560 8,880	3, 944 1, 764 3, 404 950 360 1, 290 5 7, 742 7, 136
Western	1, 609	1, 407	1, 409	1, 358	1,088	48, 615	48, 001	42, 03	42, 15	30, 567
United States	41, 865	40, 079	38, 148	39, 729	39,722	1, 277, 127	1, 317, 640	1, 118, 414	1, 277, 764	1, 112, 142

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

<sup>&</sup>lt;sup>1</sup> Preliminary.

Table 67.—Oats: Yield per acre, average 1919-1928 and annual 1926-1931, and estimated price per bushel December 1, average 1925-1929 and annual 1926-1931, by States

			Yiel	d per	acre		1	Est	imate	d pric	e per	bush	el De	c. 1
State and division	Av- er- age 1919- 1928	1926	1927	1928	1929	1930	1931	Av- er- age 1925- 1929	1926	1927	1928	1929	1930	1931
Maine New Hampshire Vermont Massachusetts Rhode Island Connecticut New York New Jersey Pennsylvania	30. 4 31. 8	31. 5 34. 0 32. 0 28. 5 30. 5	81. 5 28. 0 82. 0 30. 5 82. 5 81. 0	27. 5 32. 0 28. 0 24. 5 30. 5 26. 0	31. 0 30. 0 35. 0 30. 0 24. 5 28. 0	39. 5 44. 0 33. 0 34. 0 35. 0 40. 0 34. 0	32. 0 33. 0 31. 0 29. 0 28. 5 31. 0	71 67 54 53	Cts. 63 65 60 70 70 66 50 50	Cts. 68 70 65 70 75 69 55 53	Cts. 70 65 70 70 70 70 54 53	70 58 57	Cts. 52 54 53 52 55 55 44 48 48	Cts. 39 42 40 40 40 42 33 30 32
North Atlantic	30. 4	31. 7	82.4	29. 8	26. 6	37.1	29. 4	54. 6	51.0	55. 8	55.1	59.0	46.6	33. 2
Ohio	35. 0 30. 0 32. 0 31. 0 35. 2 35. 3 20. 1 23. 1 23. 1 22. 1	40. 5 30. 0 26. 5 31. 0 34. 5 27. 0 17. 0 17. 5 11. 0 18. 3	25. 0 25. 5 32. 0 35. 0 31. 9 15. 0 21. 0 28. 5	87. 0 37. 5 38. 0 35. 5 24. 0 28. 5 27. 0 25. 4	28. 5 33. 5 28. 1 32. 0 34. 5 35. 6 19. 0 27. 5 31. 0	29. 1 33. 5 36. 0 40. 0 87. 5 37. 0 24. 0 29. 5	31. 2 34. 0 30. 5 28. 0 27. 0 31. 0 27. 0	38 38 44 42 35 37 44 31 33 38	33 36 40	45 43 43 48 47 40 42 47 35 36 40	42 30 33 88	40 48 44 37 39 47 32 34 38	35 30 29 34 33 25 28 39 20 21 28 35	22 24
North Central			27. 5	34. 3	30. 4	33. 1	27.8	37.8	36, 8	42. 1	37.9	39. 7	28.8	21.6
Delaware Maryland Virginia West Virginia North Carolina South Carolina Georgia Florida	26. 7 27. 4 19. 2 23. 7 15. 8 21. 7 17. 6	28. 0 28. 5 22. 5 26. 0 14. 0 22. 0 16. 7	29. 0 19. 3 22. 4 14. 4 20. 3	27. 5 21. 8 28. 5 16. 0 22. 0	28. 0 20. 8 24. 1	30. 0 17. 3 19. 0 19. 0 23. 0 20. 5	30. 0 25. 6 24. 0 23. 0 25. 0 24. 0	54 66 62 74 80	50 63 59 69 67	64 64 72 75 75	63 78 88	59 67 64	50 47 60 59 68 74 74 79	40 34 35 38 39 46
South Atlantic	19. 8	21. 1	19. 6	21.	21. 9	20.8	24. 7	72, 8	65.0	70. 6	76.3	74.7	68.1	39. 5
Kantucky		19. 8 20. 6 20. 0 22. 0 19. 8 26. 0 22. 0 84. 0	14. ( 15. ! 19. ( 17. ( 17. !	16. 0 20. 0 19. 0	15. 6 20. 0 22. 0 19. 0 5 25. 0 21. 0	14. 7 16. 0 18. 0 18. 5 20 0 24. 5	20. 0 22. 0 26. 5 26. 0 29. 0 28. 5	60 73 73 58 69 45	55 68 66 52 64	70 70 58 66 44	75 75 59	62 76 76 62 70 48	68 52 55 38	39 39 30 34 19
South Central	22.	27. 1		21.	21, 8	22. 8	29. 8	50. 2	40.3	48.0	51. 1	52. 3	42.0	21.5
Montana Idaho Wyoming Colorado New Mexico Arlzona Utah Nevsda Washington Oregon California				27. 0 30. 0 20. 0 33. 0 38. 0 38. 0 38. 5 31. 5 28.	34. (0) 24. (0) 29. (0) 21. (0) 25. (0) 25. (0) 34. (0) 48. (0) 24. (0	5 37. 0 5 22. 8 31. 0 31. 0 30. 0 35. 0 40. 0 48. 8 0 37. 0 8 28. 0	34. (6) 18. (6) 23. (6) 25. (6) 30. (6) 25. (6) 32. (6) 32. (6) 19. (6) 19. (6)	47 46 47 59 60 65 55 59	44 56 75 60 62 53 50 48	50 42 43 56 70 60 65 53 63	45 60 75 56 65 51 60	51 48 60 80 70 59 56 61	36 36 55 65 41 52 36 35 43	32 30 36 35 40 46 32 33 36
Western	-		-	-	-		_		-		==			
United States	_ 29. 6	26.6	27.	32.	29.3	32. 2	28.0	40.8	39. 2	44.8	40.3	42.6	31.5	23. 1

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text,

Table 68.—Oats: World production, 1894-95 to 1931-32

	Esti-	Esti-			a	elected o	ountries			
Стор усаг	mated world produc- tion, ex- cluding Russia and China	mated Euro- pean produc- tion, ex- cluding Russia	United States	Russia 1	Ger- many	France	Canada	Poland	England and Wales	Argen- tina
1894-95. 1895-96 1896-97 1897-88 1889-99 1899-1900 1900-01 1900-01 1902-03 1902-03 1903-04 1904-05 1906-07 1907-08 1908-09 1909-10 1910-11 1911-12 1912-13 1913-14 1914-15 1915-16 1916-17 1917-18 1918-19 1918-19 1918-20 1920-21 1921-22 1922-23 1923-24 1922-25 1923-27 1922-26 1922-27 1922-28 1923-29	2,1899 2,2803 2,2824 2,2828 2,2716 2,2828 2,2821 2,	Millions bushels 1, 451 1, 457 1, 252 1, 462 1, 454 1, 455 1, 456 1, 456 1, 456 1, 456 1, 456 1, 456 1, 456 1, 457	Million bushels 662 824 707 699 731 796 914 778 1,053 869 1,009 1,096 1,096 805 805 1,186 1,121 1,549 1,259 1,538 1,184 1,496 1,306 1,503 1,488 1,247 1,183 1,247 1,248 1,247 1,248 1,247 1,248 1,247 1,248 1,247 1,248 1,247 1,248 1,247 1,248 1,247 1,248 1,247 1,248 1,247 1,248	Afillion bushels 7714 717 717 800 664 688 995 884 624 931 1,124 921 1,163 1,065 876 1,251 2,915	Million bushels 453 453 453 455 451 451 451 451 451 451 451 451 451	Million bushels 294 306 2253 322 320 3244 2291 306 2255 320 329 329 329 329 329 329 329 329 329 329	bushels	76 129 92 110 153 104 134 134 147 172 203 162	Million bushels 119 105 99 99 99 1115 106 104 96 6 141 110 103 100 88 95 105 97 104 101 107 94	Alliion bushels  1 1 1 2 2 2 4 4 6 6 6 6 4 3 2 2 6 9 7 6 6 9 8 4 4 7 7 5 6 9 8 4 6 6 7 6 6 6 5 5 6 6 5 5 6 6 6 5 5 6 6 6 6
1930-31 1931-32 6	3, 600 3, 350	1,728	1,278		427	344	349	162	87	65

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus for 1930-31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends in 1931.

<sup>&</sup>lt;sup>1</sup> Includes all Russian territory reporting for the years shown.
<sup>2</sup> Total Russian Empire, exclusive of the 10 Vistula Provinces of Russian Poland and the Province of Batum in Transcaucasia.

<sup>&</sup>lt;sup>3</sup> Exclusive of Russian Poland, Lithuania, parts of present Latvia and the Ukraine, and the Provinces

of Batum and Elizabetpol, in Transcancesia.

4 Beginning this year, estimates for the present territory of the Union of Socialist Soviet Republics, exclusive of Turkestan, Transcaucasia, and the Far East, which territory in 1924–25 produced 20,248,000 bushels.

8 Beginning with this year postwar boundaries and therefore not comparable with earlier years.

8 Preliminary.

TABLE 69.—Outs: Acreage, yield per acre, and production in specified countries, average 1921-22 to 1925-26, annual 1928-29 to 1931-32

		,	Acreege				Yle	Yield per acre	92			T I	Production		
Oountry	Aver- age, 1921-22 to 1925-26	1928-20	1928-29 1929-30 1930-31	1930-31	1931-321	Aver- age, 1921-22 to 1925-26	1928-29	1928-29 1929-30 1630-31		1931-321	Average, 1921–22 to 1925–26	1928-29	1929-30	1930-31	1981-321
North America: Ognada United States.	1,000 acres 14,585 42,850	1,000 acres 13, 137 41, 734	1,000 acres 12,479 88,148	1,000 acres 13,250 39,729	1,000 acres 12,871 39,722	Bushels 1 83. 4 80. 8	Bushels   34. 6	Bushels 24. 1 29. 3	Bushels 33. 9 32. 2	Bushels 27. 1 28. 0	1,000 bushels 486, 570 1, 318, 021	1,000 bushels 480,413 1,439,407	1,000 bushels 300, 516 1,118,414	1,000 bushels 449, 595 1,277,764	1,000 bushels 348, 795 1, 112, 142
Total	57, 435	54, 871	50, 627	£2, 988	52, 593	31.4	35.0	80	32.6	27.8	1, 804, 591	1, 919, 820	1, 418, 930	1, 727, 359	1, 460, 937
Europe: England and Wales. England and Wales. England and Wales. England and Wales. England Northern Ireland. International Internatio	2, 039 2, 039	7.72 9.76	1, 2834 884 986 986 986 972 1, 283 396 1, 283 1, 28	1, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2,	1, 25, 25, 25, 25, 25, 25, 25, 25, 25, 25	######################################	F488474646448444444444444444444444444444	డడిర్వుడిచిని ప్రభుత్వ ప్రభుత మాగా అండు ప్రభుత్వ ప	GGBG5;4;15558;5;4;2;4;5;4;5;4;5;5;5;5;5;5;5;5;5;5;5;5	26     40       26     40       26     26       27     26       28     26       28     26       28     26       28     26       28     26       28     26       28     26       28     26       29     27       20	8.4.8.2.1.7.5.8.2.4.2.8.9.2.4.2.8.2.2.2.4.7.8.2.2.2.2.2.2.4.7.8.2.2.2.2.2.2.2.4.7.8.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2	1,34,21,35,4,35,4,35,4,4,2,5,4,4,4,5,5,4,4,4,5,5,4,4,4,5,5,4,4,4,5,5,4,4,4,5,5,4,4,4,5,5,4,4,4,5,5,4	2.000000000000000000000000000000000000	8 444 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	\$3,738 \$4,2310 \$4,2310 \$4,5310 \$4,5310 \$4,5310 \$4,5310 \$4,5310 \$4,6310

Bureau of Agricultural Economics. Official sources and Informational Institute of Agriculture. Both screages and production figures refer to the year of harvests. Harvests of the Northern Liemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus for 1880-31 the crop harvested in the Northern Hemisphere countries in 1880 is combined with the Southern Hemisphere harvest which begins late in 1880 and ends early in 1831. 6 Yield per acre sown.

2-year average. \* 4-year average.

1 Preliminary.

4 1 year only.

b Acreage sown.

Table 70.—Oats: Monthly marketings by farmers, as reported by about 3,500 mills and elevators, United States, 1921-22 to 1930-31

					Perc	entage	of yea	r's rec	eipts				
Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Sea- son
1921-22 1922-23 1923-24 1923-24 1924-25 1925-26 1926-27 1927-28 1928-29 1929-30 1930-31	16. 5 15. 7 17. 7 20. 7 22. 2 21. 8 22. 7 23. 4 30. 9 29. 1	11.8 11.9 14.1 17.8 13.2 11.7 13.8 13.8 13.0 13.1	7.9 10.1 11.5 11.5 9.3 8.7 9.7 10.2 8.4	5.3 7.8 6.8 5.6 6.3 5.8 5.7 5.8 4.6 4.2	6.1 8.6 7.6 4.8 6.8 6.4 6.7 7.4 5.1	7.3 7.4 7.7 4.7 6.1 6.1 6.3 5.6 3.8 4.1	6. 9 7. 1 7. 9 3. 5 6. 2 6. 7 6. 3 6. 5 5. 1	5 6 6.5 5.2 3.9 5.6 6.2 5.1 4.1	4.3 4.7 4.8 3.9 4.2 4.4 3.8 4.9 5.1	7.2 5.4 4.5 5.5 4.1 4.3 8.5	6.0 5.9 4.6 5.6 6.4 5.4 6.2 4.9	15.1 8.9 7.0 14.0 10.4 10.9 9.3 6.8 10.5	100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0

Bureau of Agricultural Economics.

Table 71.—Oats: Receipts at primary markets, 1921-22 to 1930-31

Year beginning August	Chicago	Minne- apolis	St. Louis	Milwau- kee	Peoria	Omaha	Total 10 markets 1
1921-22 1922-23 1923-24 1924-25 1925-26 1920-27 1927-29 1928-29 1928-29 1928-30 1930-31	1,000 bush. 78, 042 85, 169 69, 902 74, 698 50, 660 49, 420 53, 609 40, 954 34, 691 21, 825	1,000 bush. 33, 072 25, 706 20, 259 54, 886 36, 616 18, 170 27, 313 20, 827 21, 534 17, 061	1,000 bush. 26, 118 33, 261 35, 791 34, 724 22, 662 19, 746 19, 394 24, 421 19, 263 9, 741	1,000 bush. 22, f12 22, 780 20, 542 14, 165 14, 857 10, 506 7, 534 12, 524 8, 290	1,000 bush. 13, 485 15, 947 13, 406 11, 164 9, 749 8, 256 8, 906 7, 305 7, 718 4, 581	1,000 bush. 10, 964 14, 886 18, 385 16, 023 13, 124 6, 636 8, 858 6, 832 9, 280 4, 550	1,000 bush. 215, 716 224, 104 219, 972 281, 562 207, 723 140, 031 155, 307 138, 058 133, 251 93, 770

Bureau of Agricultural Economics. Compiled from reports of Chicago Board or Trade, Duluth Board of Trade, Indianapolls Board of Trade, Kansas City Board of Trade, Omaha Grain Exchange, St. Louis Merchants Exchange, Milwaukee Chamber of Commerce, Minneapolis Chamber of Commerce, and Grain and Feed Journal.

Table 72.—Oats: Classification of receipts granted by licensed inspectors, all inspection points, total of all classes under each grade, 1919-20 to 1930-31

			Gr	eđe		
1 ear deginning August	No. 1	No. 2	No. 3	No. 4	Sample	Total
1919-20. 1920-21. 1921-22. 1922-23. 1923-24. 1924-25. 1925-26. 1925-27. 1927-28. 1928-29. 1929-30.	Cars 5, 052 8, 803 2, 519 2, 548 2, 724 1, 489 2, 197 1, 465 2, 838 4, 408 4, 106 10, 844	Cars 51, 006 60, 169 31, 643 41, 330 33, 631 53, 587 19, 692 29, 106 14, 144 26, 053 36, 939	Czrs 94, 497 73, 072 105, 103 95, 759 110, 377 75, 634 49, 581 64, 444 77, 823 71, 757 35, 186	Cars 15, 805 14, 766 31, 774 17, 004 22, 643 24, 550 17, 989 28, 548 19, 397 20, 684 11, 822 8, 137	Cars 3, 537 6, 831 6, 664 4, 640 11, 307 14, 863 6, 260 17, 695 5, 728 9, 305 3, 097 983	Cars 170, 497 163, 641 177, 703 167, 524 168, 963 184, 930 155, 667 116, 981 121, 513 126, 364 116, 835 91, 589

Bureau of Agricultural Economics.

<sup>&</sup>lt;sup>1</sup> Includes also Duluth, Toledo, Kansas City, and Indianapolis.

<sup>&</sup>lt;sup>2</sup> Preliminary.

Table 73.—Oats: Visible supply in United States, 1922-23 to 1931-32

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr	Мау	June	July
1922-23	5, 477 8, 086 26, 298 33, 772	10, 111 11, 403 50, 706 43, 671 21, 501 13, 376 23, 488 23, 230	16, 514 52, 715 65, 818 48, 450 24, 931 15, 193 26, 321 30, 495	20, 488 66, 564 64, 926 48, 097 23, 857 14, 472 30, 155 80, 815	18, 686 67, 265 64, 251 48, 288 23, 252 13, 295	bushels 32, 391 19, 940 72, 128 63, 187 44, 927 21, 907 13, 968	30, 801 17, 539 73, 570 63, 076 45, 422 20, 350	1,000 bushels 27, 683 17, 741 72, 886 58, 974 43, 454 19, 791 14, 898 21, 673 21, 229	24, 044 16, 715 61, 104 52, 028 87, 145 15, 746	21, 932 10, 656 48, 082 47, 025 29, 573 11, 168 10, 276 16, 242	18, 514 6, 720 35, 331 38, 976 20, 502 7, 086 9, 280 12, 652	8, 528 5, 264 33, 263 37, 900 17, 790 3, 225 7, 430 10, 875

Bureau of Agricultural Economics. Compiled from the Chicago Daily Trade Bulletin.

Table 74.—Oats: Commercial stocks in store, 1926-27 to 1931-32 DOMESTIC OATS IN UNITED STATES:

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
1926-27 1927-28 1928-29 1929-30 1930-31 1931-32	1,000 bushels 11,886 1,939 8,668 9,102 8,021	15, 992 24, 318 25, 844	26, 513 17, 561 28, 597 32, 904	25, 682 16, 900 82, 762 33, 265	24, 784 15, 399 30, 054 30, 504	47, 123 23, 815 17, 314 29, 568 30, 896	47, 421 20, 006 16, 219 26, 097	21, 127 16, 800 22, 937	38, 481 16, 803 14, 003 19, 484	30, 513 11, 667 11, 493 16, 519	22, 553 7, 171 10, 591 13, 247	17, 686 3, 338 8, 592 11, 028

### UNITED STATES OATS IN CANADA

1926–27. 1927–28. 1928–29. 1929–30. 1930–31. 1931–32.	1, 253 4 334 1, 106 207	1, 238 978 2, 177 2, 679 110	1, 435 2, 326 4, 711 2, 524 199	4, 435 2, 425	547 4,410 2,103	352 670 644 3, 735 1, 475	247 583 494 3, 236 1, 110		164 216 309 2,407 640		239	1,759 60 346 936 584
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# CANADIAN OATS IN UNITED STATES:

1926-27 1927-28 1928-29 1929-30 1930-31 1931-32	24 101 341 146 13	123 341 21	141 283 55	428	711 670 7	228 609 900 699 255	312	247 801 615	117 516	722 7330	199 577 264	123 377 91
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Bureau of Agricultural Economics. Compiled from weekly reports to the Grain, Hay, and Feed Market News Service. Data are for stocks on the Saturday nearest the 1st day of the month.

<sup>1</sup> Saturday nearest the 1st of each month.

<sup>&</sup>lt;sup>1</sup> Includes oats in store in public and private elevators in 42 important markets and also the oats affoat in vessels or barges in the harbors of lake and seaboard ports. Oats in transit either by rail or water, mill stocks, or small private stocks of oats intended only for local purposes, not included.

<sup>2</sup> Includes oats stored at lake and seaboard ports, exclusive of oats in transit on lakes and canals.

Table 75.—Oats including oatmeal in terms of grain: International trade, average 1925-26 to 1929-30, annual 1927-28 to 1930-31

				Ye	ur begin	ning Jul	<b>y</b>			
Country	A ve 1925-26-	rage 1929-30	192	7–23	1928	3–29	1929	<del>) 3</del> 0	1930	)-31 i
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORT- ING COUNTRIES Argentina	1,000 bushels 29,280	1,000 bushels 291	1,000 bushels 28,831	1,000 bushels 80	1,000 bushels 25,690	1,000 bushels	1,000 bushels 20,181	1,000 busheis	1,000 bushels 45.036	1,000 bushels 123
Germany United States Canada Chile	20, 070 17, 754 16, 656 3, 861	15, 581 207 2, 899	13, 318 9, 823 10, 194 4, 333	16, 522 202 2, 770	25, 833 16, 251 19, 532 2, 761	9, 961 399 3, 452	47, 940 7, 966 4, 600	3, 964 152 3, 980	1, 752 3, 123 10, 336 6, 512	2, 751 638 714
Czechoslovakia Irish Free State	3, 676 3, 305 3, 302	1, 260 1, 559 2 1, 499	5,862 5,740 2,611 658 1,199	530 560 1 1,619	4, 453 2, 404 936 267 790	300 1,271 8 0 1,465	1,925 4,424 2,141 5,667 2,492	1, 279 3 0 257	2, 408 847 3 6, 201 858 73	70 1, 819 3 0 55 363
Poland	1,784 1,784 1,556 495	599 81 2 48	3, 251 1, 565 414 493	9 498 282 25	48 3, 206 2, 242 325	306 0 71	1, 351 2, 614 28	506 0 48	1, 901 6	24 380
Total	103, 644	23, 817	88, 292	23, 090	104, 738	17, 226	106, 303	10, 589	79, 053	6, 937
Principal importing Countries										
United Kingdom Switzerland Belgium Netherlands Italy France Austria Denmark Sweden Finland Cuba	5 46 412 9 648 8 217 902 25	30, 339 10, 936 8, 210 7, 851 7, 016 6, 598 6, 092 3, 255 2, 956 1, 891 41, 215	713 4 30 260 1 1,735 123 536 92 0	31, 309 9, 770 6, 607 6, 938 9, 064 2, 490 5, 303 2, 155 2, 215 990 1, 051	1,020 5 15 773 1 396 6 326 720 13 0	25, 862 10, 741 9, 357 6, 486 5, 429 7, 292 5, 774 2, 574 4, 172 3, 504	958 6 40 576 23 234 5 62 490 0	33, 196 13, 613 8, 894 11, 902 5, 119 5, 792 8, 684 8, 783 3, 853 2, 155	1, 237 13 49 1, 173 76 13 65 451 24	35, 576 14, 26; 10, 79- 10, 65; 12, 00; 6, 50; 6, 58; 4, 58; 3, 77; 96;
Latvia 6 Norway Estonia Greece Australia Union of South Afri-	110 8 0 0 155	1, 127 714 693 4 348 276	8 5 0 0 111	1, 223 683 651 200 670	0 9 0 0 144	2, 883 336 1, 356 108 69	512 10 0 0 184	309 556 339 600 38	14 13 0 0 8 234	179 58 534 3 8 7
caJapan 6	148 0	160 96	134 0	141 6	143 0	120 76	169 0	107 100	84	104
Total	3, 863	89, 773	3, 759	81, 466	3, 751	87, 126	3, 248	104, 150	3, 447	106, 604

Bureau of Agricultural Economics. Official sources except where otherwise noted.

<sup>1</sup> Preliminary.
2 3-year average.
2 Monthly Crop Report and Agricultural Statistics.
4 4-year average.
5 Calendar year.
6 Year beginning August 1, International Yearbook of Agricultural Statistics.

Table 76.—Oats: Estimated average price per bushel received by producers, United States, 1922-23 to 1931-32

Стор Уеаг	Aug. 15	Sept.	Oct. 15	Nov. 15	Dec.	Jan. 15	Feb.	Mar. 15	Apr. 15	Мау 15	June 15	July 15	Weight ed aver- age
1922-23 1023-24 1024-25 1925-26 1925-27 1927-28 1928-29 1928-20 1930-31 1931-32	Cents 33. 6 37. 6 49. 1 40. 7 37. 9 44. 4 38. 4 42. 7 35. 7 19. 8	Cents 33. 4 38. 0 47. 1 38. 1 35. 6 43. 9 36. 7 44. 1 36. 1 20. 0	Cents 36. 4 39. 4 48. 9 37. 2 39. 0 44. 6 39. 0 44. 8 34. 7 20. 1	Cents 38. 8 40. 8 47. 4 37. 6 39. 8 45. 1 39. 8 43. 1 31. 5 23. 2	Cents 40. 3 42. 6 50. 6 39. 1 41. I 48. 1 42. 5 43. 6 32. 3 23. 0	Cents 41. 5 43. 4 54. 0 40. 0 42. 6 49. 3 43. 7 43. 1 31. 1	Cents 42. 4 45. 4 53. 4 89. 2 43. 4 51. 3 47. 0 43. 0 80. 7	Cents 43. 5 46 2 49. 7 38. 8 43. 4 54. 5 46. 6 41. 4 30. 1	Cents 44, 8 46, 5 41, 7 39, 4 43, 2 56, 9 45, 8 42, 4 30, 2	Cents 45 3 46. 3 46. 3 45. 4 45. 4 62. 0 41. 6 40. 9 28. 6	Cents 43. 7 46. 8 48. 3 38. 9 48. 0 61. 4 42. 5 39. 3 20. 1	Cents 40. 2 49. 4 45. 3 37. 7 46. 3 56. 2 42. 9 33. 1 23. 3	Cents 39. 0 42. 6 48. 3 39. 0 41. 2 48. 9 41. 1 41. 9 31. 9

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by monthly marketings. Mean of prices reported on 1st of month and 1st of succeeding month, August, 1922–December, 1923.

Table 77.—Oats, No. 3, white: Weighted average price 1 per bushel of reported cash sales, Chicago, 1909-10 to 1931-32

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Weight- ed aver- age
1908-10 1910-11 1911-12 1913-13 1913-14 1913-14 1914-15 1916-16 1916-17 1917-18 1918-19 1919-20 1920-21 1920-21 1921-22 1922-23 1922-23 1923-24 1924-25 1924-25 1925-26 1926-27 1927-28 1928-29 1928-29 1928-29 1928-30 1930-31	Cents 38 35 41 38 42 42 41 461 70 32 32 32 38 47 38 43	Centa	Cents 40 32 47 33 40 46 49 60 54 42 43 50 34 42 43 36	Cents 40 32 48 32 40 48 36 55 672 73 511 88 43 43 50 40 42 49 44 45 33	Cents 44 32 47 32 47 32 40 49 42 53 77 72 828 44 44 44 44 46 46 45 34 46 45 34	Centa 48 33 50 33 39 53 48 57 82 65 64 44 49 45 55 50 45 55 55 55 32	Cents 47 31 52 33 39 58 45 56 89 86 42 48 53 41 48 56 50 50 42 43 22	Cents 44 53 31 53 39 57 42 93 63 93 45 45 47 48 40 448 43 31	Cents 42 32 357 35 399 577 44 69 89 101 36 48 42 42 45 63 48 30	Cents 40 34 555 38 40 777 69 109 38 45 45 41 50 67 45 41 28	Cents 39 39 53 40 40 49 39 67 77 70 113 37 43 51 49 40 40 68 45 388	Cents 41 44 49 40 37 78 778 91 34 44 42 45 56 47 83	Cents 422 233 500 355 500 500 500 500 500 500 500 5

Bureau of Agricultural Economics. Compiled from the Chicago Dally Trade Bulletin. Data for 1899-1908 available in 1924 Yearbook, p. 628, Table 94.

<sup>1</sup> Average of daily prices weighted by car-lot sales.

Table 78.—Barley: Acreage, production, value, exports, etc., United States, 1900-1951

				Price	<b></b>	Price per	Foreign flour, July	and ma	including lt, year b	barley, eginning
Year	Acre- age har-	Aver- age yield	Produc-	per bushel re-	Farm value, basis	bushel at Chi- cago,			Net ex	ports 3
	vested	per acre	tion	ceived by pro- ducers Dec. 1	Dec. 1 farm price	year begin- ning August <sup>1</sup>	Domes- tic ex- ports	Im- ports	Total	Per- cent- age of produc- tion
	1,000	Bushels	1,000	Come	1,000	Comto	1,000	1,000	1,000	Per
1000	acres 4, 545	of 48 lbs. 21, 1	bushels 96, 041	Cents 40.5	dollars 38, 896	Cenis	busheis 6,619	bushels 175	bushels 6, 445	cent
1900	4,742	25. 7	121, 784	45.2	55.068	64	9,079	60	9, 019	6.7 7.4
1902	5, 126	29.1	149, 389	45.5	67, 944	56	8,745	59	8, 686	5.8
1903	5, 563	26.4	146, 864	45.4	66,700	56	11, 280	94	11, 187	7.6
1904	5, 912	27.4	162, 105	41.6	67, 427	49	11, 105	84	11,021	6.8
1905	6, 250	27.2	170, 089	39.4	66, 959	50	18, 431	20	18, 410	10.8
1906	6, 730	28.6	192, 270	41.6	80,069	61	8,616	41	8, 632	4.5
1907	6, 941	24. 5	170,008	66. 3	112,675	84	4,554	202	4, 870	2.6
1903	7, 291	25.3	184, 857	55. 2	102, 037	67	6,729	4	6, 725	3.6
1909	7,699	22.5	173, 344							
1909	7, 699 7, 743	24. 4 22. 5	187, 973	54.8	102, 947	67	4,454	5	4, 449	2.4
1910 1911	7, 743	21.0	173, 832 160, 240	57. 8 86. 9	100, 426	92	9,507	187	9, 320 5 1, 117	5.4
1912	7, 530	29.7	223, 824	50.5	139, 182 112, 957	122 68	1,655 17,874	2, 772 15	17, 859	8.0
1913	7, 499	23.8	178, 189	53.7	95, 731	65	6,945	351	6, 594	3.7
1914	7, 565	25.8	194, 953	54.3	105, 903	72	28,712	103	28, 609	14.7
1915	7. 148	32.0	228, 851	51.6	118, 172	69	30.821	37	30, 783	13.5
7916	7, 757	23.5	182, 309	88.1	160, 646	191	20,319	462	19, 857	10.9
1917	8, 933	23.7	211,759	113.7	240,758	146	28,717	517	28, 200	13.3
1918	9,740	26.3	256, 225	91.7	234, 942	104	29, 324	24	29, 301	11.4
1919	6, 478	18.9	122,025							
1919	6, 579	19.9	131, 088	121.5	159, 258	145	34,691	335	34, 356	26. 2
1920	7, 438	23. 1	171, 533	71.6	122,746	78	27, 255	20	27, 234	15.9
1921	7,073	18.5	130, 747	42.1	55, 059	61	27,546	8	27, 538	21.1
1922 1923	6, 599 7, 150	23.3	153, 771 158, 967	52.5	80,792	65	21,909	38	21,871	14.2
1924	6,767	23. 5	159, 139	53. 5	85, 089	72	13, 913	55	13, 858	8.7
1924	6, 910	24.0	165, 814	74.7	123, 830	90	28, 543	48	28, 495	17. 2
1925	8,076		192, 671	58.6	112,809	72	30, 448	53	30, 395	15.8
1926	7, 840	20.9	163, 712	57.1	93, 510	77	19.655	49	19, 605	12.0
1927	9.419	25.6	240, 993	67.5	162.741	91	39, 274	45	39, 230	16.3
1928	12,710	26. 1	331, 148	54.7	180,980	60	60, 295	45	60, 249	18.2
1929	13, 523	20.7	280, 242	54.4	152, 334	62	24,054	41	24, 013	8.6
1930	12,662	24. 1	304, 601	38.9	118, 359	54	11,443	1, 413	10, 025	
1931 6	11,471	17.3	198, 965	35.2	70, 119	1		,		

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board, revised, 1919 to 1928. See introductory text; italic figures are census returns. See 1927 Yearbook, p. 799, for data for earlier years.

Preliminary.

<sup>1</sup>From Bureau of Labor Statistics as follows: Bulletin No. 39, 1900-1901. August, 1900-December, 1901, choice to fancy malting, by samples. Wholesale price bulletins—monthly quotations, January, 1902-December, 1913, choice to fancy malting; January, 1914-September, 1927, fair to good malting. Beginning October, 1913, choice to fancy malting; January, 1914-September, 1927, fair to good malting. Beginning October, 1927, grade reported as feeding, but as quality remained unchanged, no change was made in comparative prices.

2 Compiled from Commerce and Navigation of the United States, 1900-1917: Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June Issues, 1919-1926; January and June issues, 1927-1931; and official records of the Bureau of Foreign and Domestic Commerce. Malt converted to terms of barley on the basis that 1.1 bushels of malt is the product of 1 bushels of barley. Barley flour converted on the basis that 1 barrel of flour is the product of 9 bushels of barley. Exports of flour not reported prior to 1919. Barley—general imports, 1900-1909; imports for consumption, 1910-1931. Malt—general imports, 1909-1914; imports for consumption, 1915-1931.

3 Total apports (domestic exports plus reexports) minus total imports.

4 Average for 11 months.

5 Net imports.

7 Total imports minus total exports (domestic plus foreign).

6 Freliminary.

Table 79.—Barley: Acreage harvested and production, by States, average 1924-1928, annual 1928-1931

		Acre	age harv	ested			I	Production	n	
State and division	Aver- age, 1924- 1928	1928	1929	1930	1931 1	Average, 1924- 1928	1928	1929	1930	1931 1
Maine	1,000 acres 3 5 182 1 18	1,000 acres 3 5 202 1 29	1,000 acres 3 5 181 1 36	1,000 acres 3 5 168 1 45	1,000 acres 3 5 173 1 60	1,000 bushels 95 141 5,184 29 445	1,000 bushels 81 110 5,252 30 740	1,000 bushels 89 130 4,000 22 774	1,000 bushels 96 140 5,208 32 1,170	1,000 bushels 87 150 4,325 32 1,590
North Atlan- tic	210	240	226	222	242	5, 893	6, 213	5, 015	6, 646	6, 184
Ohio	153 36 357 165 544 1,383 367 10 1,811 1,080 277 425	318 78 624 264 725 2,064 802 11 2,435 1,715 430 608	91 37 400 231 703 2, 240 685 10 2, 875 2, 070 648 582	109 38 288 238 703 1,994 548 13 2,588 1,987 726 512	96 53 297 278 731 1,874 521 23 1,812 1,833 854 563	4, 175 766 10, 884 4, 418 17, 248 38, 045 11, 415 37, 630 22, 797 6, 462 6, 171	8, 427 1, 599 18, 408 7, 524 23, 925 57, 792 26, 486 176 56, 005 36, 015 12, 470 13, 072	2, 093 781 10, 200 4, 481 20, 387 53, 760 19, 865 38, 812 35, 811 15, 552 9, 603	2, 943 950 8, 640 6, 593 23, 902 53, 838 16, 166 217 43, 996 42, 720 18, 876 10, 496	2, 736 1, 293 8, 613 7, 228 19, 006 37, 480 13, 546 552 18, 482 16, 680 14, 091 8, 726
North Cen- tral	6, 607	10, 074	10, 572	9, 744	8, 935	160, 205	261, 879	211, 480	229, 367	
Maryland Virginia North Carolina	9 12 10	8 11 16	10 13 19	12 15 21	16 17 24	260 307 178	220 314 288	291 333 342	384 342 368	528 570 480
South Atlan- tic	81	35	42	48	57	744	822	966	1, 094	1, 578
Kentucky Tennessee Oklahoma Texas	5 15 119 167	10 62 172	5 11 71 194	7 13 67 184	12 17 117 221	120 259 1, 826 3, 112	46 171 1, 023 2, 924	118 207 1, 136 3, 783	140 229 838 2,760	336 382 2, 457 5, 194
South Cen- tral	305	246	281	271	367	5, 318	4, 164	5, 244	3, 967	8, 369
Montana Idaho	160 122 57 387 7 13 23 7 65	215 132 104 512 8 8 34 49 76	258 135 137 608 8 9 38 5 54 84	232 148 130 572 9 10 42 6 58 76	139 158 98 458 11 10 38 5	4,303 3,791 1,418 7,107 114 415 857 292 2,042	6, 450 4, 290 2, 496 11, 776 144 272 1, 380 280 1, 686	4, 128 4, 320 2, 808 10, 944 150 270 1, 452 181 1, 620	3, 828 5, 328 2, 600 12, 298 180 320 1, 806 240 1, 827 2, 280	1, 946 4, 108 1, 568 7, 099 253 320 1, 216 155 1, 888
	925	969	1,066	1,094	74 820	1, 909 24, 460	2, 204 27, 132	2, 562 29, 102	32,820	2,072 13,776
Western United States	1, 838 8, 991	2, 115	2, 402 13, 523	2, 377 12, 662	1,870	46, 708 218, 868	58, 070 331, 148	57, 537 280, 242	63, 527 304, 601	34, 401 198, 965

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

<sup>&</sup>lt;sup>1</sup> Preliminary

Table 80.—Barley: Yield per acre, average 1919-1928 and annual 1926-1931, and estimated price per bushel, December 1, average 1925-1929 and annual 1926-1931, by States

			Yie	d per	BCTE			Esti	mated	l pric	e per	bushe	l, De	c. 1
State and division	A ver- age, 1919- 1928	1926	1927	1928	1929	1930	1931	A ver- age, 1925- 1929	1926	1927	1928	1929	1930	1931
Maine	25. 9	30. 0 26. 0 28. 3 33. 0	27.0	22.0 26.0 30.0	29. 7 26. 0 22. 1 22. 0	32.0 28.0 31.0 32.0	25. 0 32. 0	85	Cts. 92 85 75 85 80	Cts. 94 95 80 83 83	Cts. 110 110 78 86 84	Cts. 100 90 84 85 90	Cts. 81 85 62 65 70	
North Atlantic	25. 7	28. 0	28, 5	25. 9	22. 2	29. 9	25. 6	80. 0	75. 9	80.7	79.8	85. 4	64, 2	46. 5
Ohlo Indiana Illinois Michigan Wisconsin Minesota Iowa Missouri North Dakota South Dakota Nebraska Kansas	20. 3 29. 4 23. 4 28. 9 24. 6 27. 8 19. 6 18. 4 19. 6 21. 6	31. 0 26. 5 31. 0 22. 5 28. 5 18. 0 13. 5 9. 0	26. 0 20. 0 29. 5 26. 5 31. 0 28. 0 30. 0 18. 5 22. 5 26. 0 27. 5	20. 5 29. 5 28. 5 28. 0 28. 0 16. 0 21. 0 21. 0 29. 0	25. 5 19. 4 29. 0 24. 0 29. 0 13. 5 17. 3 24. 0	25. 0 30. 0 27. 7 34. 0 27. 0 29. 5 19. 0 17. 0 21. 5 26. 0	24. 4 29. 0 26. 0 26. 0 20. 0 24. 0 10. 2 9. 1 16. 5	61 70 67 53 57 86 47 50	58	73 76 76 75 65 66 95 59	65 50 54 80 43 48 51	65 48 52 80 42 45 50	50 50 48 55 51 35 41 60 26 29 35	39 40 43 34 34 37 26 32
North Central	22. 0	19. 0	25. 6	26.0	20. 0	23 5	16.6	54. 5	54.7	64.0	51. 2	49.7	85. 7	33, 2
Maryland Virginia North Carolina	25.4	29. 5	26. 5 24. 0 18. 5		29. 1 25. 6 18 0	32. 0 22. 8 17 5	33. 0 33. 5 20. 0	91	80 90 100				75 87 106	45
South Atlantic	24. 9	26. 7	22, 5	23. 5	23.0	22.8	27.7	97.3	88. 9	94.4	97. 3	103. 2	89. 2	52.6
Kentucky Tennessee Oklahoma Texas	22. 5 17. 7 15. 6 19. 3		22, 5 14, 5 11, 0 13, 5	17. 1 16. 5	18.8 16.0	17.6 12.5	22. 5 21. 0	104	96 58	100	110 65	63	83 98 51 55	56 26
South Central	17.7	25. 3	13.0	16.9	18.7	14.6	22. 8	70.7	57. 2	71.6	72.8	64. 6	57. 6	29. 9
Montana Idaho Wyoming Colorado New Mexico Arizona Utah Nevada Washington Oregon California	29. 6 22. 6 19. 4 17. 6 30. 1 32. 3 36. 0 31. 5	29. 0 25. 5 15. 5 23. 0 27. 0 34. 0 40. 0 32. 0 24. 0	20. 0 16. 0 30. 0 39. 0 47. 0 39. 0	32. 5 24. 0 23. 0 18. 0 40. 0 35. 0 34. 0	32. 0 20. 5 18. 0 18. 7 30. 0 38. 2 36. 2 30. 0	36.00 20.00 21.57 20.00 32.00 43.00 31.50 30.00	26. 0 16. 0 15. 5 23. 0 32. 0 31. 0 28. 0	63 62 55 75 85 77 82 72	60 62 55 65 85 72 85 65 65	68 61 56 70 75 76 80 77	68 61 54 75 80	66 64 54 81 85 78 85 78	41 41 44 40 62 65 52 65 47 50 48	33 55 52 62 42
Western			27. 2	27. 5	24.0	26.7	18.4	68. 2	59. 6	77.8	65. 5	67. 1	45.6	42, 6
United States	22. 8	20.9	25. 6	26.1	20.7	24.1	17.8	58. 5	57, 1	67, 5	54.7	54.4	38. 9	35. 2

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

<sup>&</sup>lt;sup>1</sup> 5-year average.

Table 81.—Barley: World production, 1894-95 to 1931-32

Canada   C	Crop year	Esti- mated world produc-	Esti- mated Euro- pean produc-			£	Selected	countries	B		
1894-95		cluding Russia	tion, ex- cluding		Russia 1	Ger- many	Japan	Canada	India	Spain	
1,747 827 280 325 146 80 102 118 97 12 1930-31 1,687 762 305 131 72 135 107 104 10	1896-96 1896-97 1897-98 1898-99 1899-1900 1900-01 1901-02 1902-03 1903-04 1904-05 1906-07 1907-08 1908-09 1908-10 1910-11 1911-12 1912-13 1913-14 1914-15 1915-16 1918-17 1917-18 1918-19 1919-20 1920-21 1921-22 1922-23 1923-24 1924-25 1925-26 1928-29	936 1, 908 973 1, 040 1, 017 1, 085 1, 129 1, 088 1, 068 1, 068 1, 161 1, 133 1, 242 1, 133 1, 242 1, 134 1, 243 1, 170 1, 251 1, 170 1, 251 1, 170 1, 251 1, 170 1, 251 1, 186 1, 1	524 527 523 481 584 583 523 570 589 510 589 621 589 621 589 637 546 477 427 424 483 554 588 649 672 672 672 674 675 676 677 677 677 677 677 677 677 677	78 115 99 103 100 117 96 122 149 147 162 170 188 174 160 224 178 188 174 189 189 189 189 189 189 188 188 188 188	197 226 254 239 307 227 237 240 338 357 346 347 351 377 402 488 437 496 600 2 433 3 429 4 305 176 196 181 181 186 181 289 246	128 125 118 123 125 118 128 127 128 128 128 128 128 128 128 128 128 128	810 871 773 823 874 811 777 824 801 801 801 801 802 803 804 805 809 809 809 809 809 809 809 809 809 809	47 55 29 44 49 48 54 55 77 77 86 63 63 63 72 77 89 87 106	125 143 148 156 156 150 117 146 145 123 123 123 119 98	577 447 366 463 554 463 554 463 554 463 554 554 779 778 778 778 778 778 778 778 778 778	1,000,000 bushels 17 22 32 11 300 5 15 25 30 12 26 26 20 29 30 26 26 34 44 94 61 31 12 100 6

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus for 1930-31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931.

Includes all Russian territory reporting for the years shown.
Total Russian Empire exclusive of the 10 Vistula Provinces of Russian Poland and the Province of Batum in Transcaucasia.

Exclusive of Russian Poland, Lithuania, parts of present Latvia and the Ukraine, and two Provinces

of Transcaucasia.

6 Beginning this year, estimates within present boundaries of the Union of Socialist Soviet Republics excluding Turkestan, Transcaucasia, and the Far East, which regions in 1924-25 produced 20.897,000 bushels.

<sup>8</sup> Postwar boundaries beginning this year and therefore not comparable with earlier years.
8 Beginning this year weighed bushels, those reported for the earlier years being measured bushels.
7 Preliminary.

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			Acreage				Yle	Yield per ac	acre			I	Production		
Country	Aver- 8ge, 1921-22 to 1925-26	1928-29	1929-30	1630-31	1981-321	Aver- age, 1921-22 to 1925-26	1928-29	1929-30	1930-31	1931-321	Avarage, 1921–22 to 1925–26	1928-29	1929-30	1830-31	1981-32 1
NORTHARN HEMISPHERE North America: Canada United States. Estimated North American to-	1,000 acres 3,022 7,498	1,000 acres 4,881 12,598	1,000 acres 5,926 13,523	1,000 acres 5,559 12,682	1,000 acres 3,768 11,471	Bushels 25.4 24.8	Bushels 27.9 28.4	Bushels 17.3 20.7	Bushels 24. 3 24. 1	Bushels 17. 9 17. 3	1,000 bushels 76,899 186,029	1,000 bushcis 136,391 367,487	1,000 bushcls 102, 313 250, 212	1,000 bushels 135, 160 304, 601	1,000 bushets 67,383 198,965
tal	11,200	17,900	18,800	18,600	16,700						267,000	499,000	385,000	443,000	271,000
Buropei: Sugland and Wale- Suckland. Suckland. Noway Noway Sweden Demmak Nethorlands Selgium Franco. Spain. Franco. Spain. Franco. Spain. Franco. Spain. Franco. Spain. Franco. Bulgaria. Rumania. Rumani	1. 32 1. 32	8111 8211 8211 8211 8211 8211 8311 8311	1, 120 1181 1182 1183 1183 1194 11, 1283 11, 128	20.1 20.2 20.2 20.2 20.2 20.2 20.2 20.2	1, 020 1,	**************************************	<b>仏会が洗洗びみ成為我のは紅路路路のは此次は外ばらばれば、こうりょうりのストッチの下のりのころのきょうそのこめらしのこ</b>	44848444841488844444444444444444444444	統上 <b>代</b> 総協協協議議議議議議議議議議議議議議議議議議議議議議議議議議議議議議議議議議	88	64 25,4,4,4,4,4,4,4,5,5,7,7,7,7,7,7,7,7,7,7,	7.4.0.0.0.0.0.0.4.4.0.0.0.0.0.0.0.0.0.0.	46,565 46,565 111,373 181,3	3,4,37,4,4,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,	88. 4. 14. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.
	25, 549	26, 538	28,300	27,892	28, 174	133.1	27.4	28.7	28.7	24.1	591, 105	726, 892	813, 285	744, 691	677, 951
cluding Russia.	26, 300	27,400	29,000	28,700	29,000		-				606,000	743, 000	827,000	762, 000	696, 000

Atricas: Morrocoo Morrocoo Tuerta Trunts Egypt	2,862 1,033 381	3,411 1,459 366	3,240 1,248 401	3, 207 3, 674 1, 202 345	3, 156 3, 199 1, 087 306	14.1 10.2 6.6 30.0	16.6 11.6 8.7 29.5	11.6 9.2 31.6	11.7 10.4 4.6 30.4	16.3 9.7 7.6 31.7	40, 304 30, 779 6, 843 11, 427	48, 230 39, 716 12, 681 10, 798	47, 316 40, 445 11, 482 12, 660	37, 400 38, 182 5, 512 10, 505	51, 341 31, 008 8, 268 9, 663
Estimated African total	8, 100	8, 400	9,000	8,900	8,200						101, 000	117,000	120,000	98, 000	107, 000
Asia: Turkey India. Eyris and Lebanon Japan Chosen.	2, 146 7, 501 1,796 2, 630 2, 131	3, 662 7, 858 2, 242 2, 209	3, 186 9, 156 2, 196 2, 295	3, 418 8, 601 2, 115 2, 382	941 2,106 2,410	29.5 17.8 49.5 31.4	11 12 14 15 15 15 15 15 15 15 15 15 15 15 15 15	24.2 12.8 30.7 16.4	20.21 20.22 4.4.22 7.33 7.33	15.1 36.4 17.4	8 57, 482 133, 793 7, 300 82, 490 86, 607	41, 319 97, 720 13, 769 81, 477 34, 167	77, 083 117, 600 24, 406 80, 374 37, 612	60, 348 106, 867 22, 769 72, 470 39, 847	14, 108 76, 522 41, 861
Estimated Asiatic total	17, 100	19,600	20, 400	20, 200	17,800						347,000	298,000	368, 000	343,000	333, 000
Total Northern Hemisphere countries reporting area and production all years.	48, 919	57, 532	61, 460	59, 908	50, 617	21.9	25.4	8 8	8	30.8	1, 069, 783	1, 461, 548	1, 450, 144	1, 411, 227	1, 177, 180
sphere total excluding Russia and Ohina	62, 700	73, 300	78, 200	76, 400	70, 700						1, 321, 000	1, 667, 000	1, 700, 000	1, 646, 000	1, 407, 000
SOUTHERN HEMISPHERE															
Chile. Argentina. Union of South Africs. Australia.	162 504 97 307	194 911 74 355	152 802 91 461	166 921 70	106	83.0 19.7 19.7	31.5 18.5 19.4	20.2 20.1 23.0 17.5	14.9	6 13, 1	5,347 9,924 1,189 6,048	6, 116 16, 814 1, 376 6, 893	4, 589 16, 131 2, 097 7, 905	3, 876 14, 000 1, 046	18,831
Estimated Southern Hemisphere total	1, 600	2, 300	2, 100	2, 100	2,600						31,000	42,000	47,000	41,000	48,000
Total Northern and Southern Hemisphere countries report- ing area and production all	64.08	F8 443	SAC UA	968	58 O58	8.1.8	25.3	9	91	9	1. 079. 707	1, 478, 362	1. 406, 275	1, 426, 227	1, 196, 011
Estimated world total excluding Russia and China.	64, 200	76, 600	80,300	78, 500	73,800						1, 352, 000	1, 699, 000	1, 717, 000	1, 657, 000	1, 455, 000
		_	_		-		-	-	-	-		-		-	

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. Both acresso and production figures refer to the year of invest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Remisphere which framediately follow; thus for 1930-31 the crop harvested in the Northern Hemisphere harvest which begins late in 1830 and early in 1831. Астенде ьоwn.

2. Pear average. 1 Preliminary.

1 year only.

44-year average.

'Yield per acre sown.

Table 83.—Barley: Monthly marketings by farmers as reported by about 3,500 mills and elevators, United States, 1921-22 to 1930-31

					Perc	entage	of yea	r's rec	elpts				
Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Ser-
1921-22 1922-23 1923-24 1924-25 1925-26 1926-27 1927-28 1928-29 1928-30 1930-31	14.0 92.9 23.7 16.8 19.1 16.5 17.4 21.4 24.7 25.0	10. 5 14. 6 15. 1 21. 4 18. 4 11. 6 18. 7 18. 3 14. 0 15. 7	7.8 10.8 9.9 17.0 11.7 7.4 12.2 11.8 8.9 10.0	4. 4. 5. 2. 7. 8. 1. 6. 6. 2. 8. 0. 6. 7. 5. 8. 5. 8.	4.2 6.5 5.7 5.1 4.8 5.0 5.1 5.0	3.9 4.8 4.1 5.1 4.0 5.1 4.7 3.5 3.3 4.6	432584425925	4.2 3.5 3.1 3.3 3.1 3.9 4.5 3.2 3.1 3.2	3.09 2.64 2.00 3.61 2.17 2.63 3.21	4473273417 2234427 2344 2344	4.3 7.0 11.1 4.7 6.9 16.2 10.4 7.4 9.9 13.9	35. 0 17. 4 10. 3 9. 0 16. 4 17. 4 9. 1 12. 6 16. 4 6. 7	100. 0 100. 0 100. 0 100. 0 100. 0 100. 0 100. 0 100. 0

Bureau of Agricultural Economics.

Table 84.—Barley: Receipts at specified markets, 1921-22 to 1930-31

Year beginning August	Minne- apolis	Duluth	Chicago	Milwau- kee	Omaha	Total 5 markets	Fort William and Port Arthur
1921-22 1922-23 1923-24 1924-25 1925-23 1926-27 1927-28 1928-29 1929-30 1930-31 3	1,000 bushels 11,926 14,244 15,396 23,188 23,245 12,086 22,982 27,174 18,039 18,080	1,000 bushels 5,179 3,841 3,654 14,501 13,244 6,667 22,630 32,764 11,084 6,165	1,000 bushels 7,573 10,103 9,755 11,336 9,540 8,386 11,320 16,680 6,601 6,562	1,000 bushels 9, 330 8, 922 9, 077 13, 127 10, 673 8, 440 11, 061 13, 554 13, 121 10, 883	1,000 bushels 1,152 801 948 796 729 594 1,768 2,259 1,656 1,038	1,000 bushels 35, 160 37, 914 38, 830 62, 918 57, 431 36, 173 69, 761 92, 431 50, 501 42, 828	1,000 bushels 11,597 15,756 15,910 28,045 36,662 35,784 23,652 45,498 18,761 18,141

Bureau of Agricultural Economics. Compiled from reports of Minneapolis Chamber of Commerce, Duluth Board of Trade, Chicago Board of Trade, Milwaukee Chamber of Commerce, Omaha Grain Exchange, American Elevator and Grain Trade, and Canadian Grain Statistics.

Table 85.—Barley: Classification of receipts graded by licensed inspectors, all inspection points, total of all classes under each grade, 1926-27 to 1930-31

Voca hardanian Tuly	_	Grade												
Year beginning July	Choice No. 1	No. 1	Choice No. 2	Special No. 2	No. 2	Choice No. 3	No. 3	No. 4	No. 5	No. 1 feed	Sam- ple	Total		
1926-27 <sup>1</sup>	Cars 251 262 329 223 261	Cars 481 2, 199 966 700 1, 483	Cars 107 90 100 50 76	14, 913 13, 128 9, 966	12, 151 20, 900 5, 800	274 392 315	16, 299	6, 197 20, 129 7, 269	183 135 102	2, 875 6, 502 8, 602	10, 923 11, 021 5, 124	Cars 30, 633 66, 336 98, 866 47, 058 43, 647		

Bureau of Agricultural Economics.

<sup>1</sup> Crop year begins September 2 Preliminary.

Barley grades became effective Aug. 24, 1926.

Table 86.—Barley: Commercial stocks in store, 1926-27 to 1931-32

DOMESTIC BARLEY IN UNITED STATES:

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Caly
1926-27 1927-28 1928-20 1929-30 1920-31 1931-32	1,000 bushels 3, 108 3, 335 9, 798 6, 746 6, 568	5,041 9,318 12,894	6, 549 10, 681 12, 568	5, 957 11, 067	5, 769 11, 744 11, 760	bushels 7.097	1,000 bushels 6, 64 4, 423 11, 985 10, 961 14, 261	1,090 bushels 6, 116 4, 273 11, 399 10, 415 12, 279	1,000 bushels 5, 339 4, 588 9, 908 9, 726 10, 159	bushels 3, 675 3, 890 8, 412	1,000 bushels 3,046 2,410 7,873 6,843 6,232	1,000 bush-16 2,726 2,801 6,861 6,366 6,716
	·	נט	NITED	STAT	res b	RLEY	IN C.	ANAD	A		·	

1920-27 1927-28 1928-29 1929-30 1930-31 1931-32	5 0 279 797 45	66 767 246 652 24	605 4,171 1,266 580 24	344 5,599 1,749 444 24	152 2,319 955 371 24	272 40 1,144 972 338	300 42 312 937 309	64 9 173 938 291	70 25 170 936 272	50 9 81 993 243	0 1 92 963 68	13 £; C70 9.7 45
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#### CANADIAN BARLEY IN UNITED STATES:

1926-27 1927-28 1927-29 1929-20 1929-30 1930-31 1931-32 1931-32 1931-32 1931-32 1931-32	27 717 1,751 2,959 1,654 1,999 725 832 4 4	3 1,945 1,4 6,210 4,7 3,086 3.0	246 1,677 08 409 1,191 557 781 3,232 2,239 906 2,928 2,781 1,267 903	2, 401
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Bureau of Agricultural Economics. Compiled from weekly reports to the grain, hay, and feed market news service. Data are for stocks on the Saturday nearest the 1st day of the month.

Table 87.—Barley: Estimated average price per bushel received by producers, United States, 1932-23 to 1931-33

Crop year	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 13	July 15	Weight- ed aver- age
1922-23 1032-21 1924-25 1925-26 1927-27 1927-28 1928-29 1029-80 1029-80 1031-32	Cents 47.7 52.2 75.7 67.1 55.0 69.0 58.9 55.8 43.6	Cents 40. 2 51. 9 75. 6 60. 8 52. 9 69. 5 54. 1 55. 2 45. 3 30. 9	Cents 49. 2 54. 7 51. 4 57. 6 54. 4 66. 8 55. 2 54. 7 41. 9 31. 6	Cents 52 0 55. 2 70. 7 5% 0 66. 8 54. 5 53. 8 35. 5	Cents 55. 6 57. 6 76. 2 58. 4 71. 5 54. 6 38. 8 35. 7	Cents 56, 8 56, 5 52, 4 59, 5 58, 0 73, 6 56, 2 53, 9 36, 6	Cents 56. 2 58. 0 84. 8 56. 3 61. 3 75. 4 60. 5 52. 5 35. 3	Cents 58. 0 60 0 81. 5 54. 6 62. 2 79. 4 60 1 51. 4	Cants 59.6 61.0 76.1 54.8 64.1 81.3 58.0 51.7 35.2	Cents 60 8 60 0 75.9 55.1 68 4 84.5 55.3 50.5	Cents 58, 3 61, 9 76, 4 53, 7 76, 3 81, 7 52, 6 47, 5	Cents 54. 7 68. 8 73. 5 55. 3 71. 4 77. 6 55. 6 40. 0 30. 0	Cents 51.8 56.6 77.4 59.2 61.9 72.7 56.1 51.8 39.3

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by monthly marketings. Mean of prices reported on 1st of month and 1st of succeeding month, August, 1922–December, 1923.

<sup>&</sup>lt;sup>1</sup> Includes barley in store in public and private elevators in 42 important markets and also burley affect in vessels or barges in harbors of lake and seaboard ports. Barley in transit either by rail or water, mill stocks, or small private stocks of barley intended only for local purposes, not included.

<sup>2</sup> Includes barley stored at lake and seaboard ports, exclusive of barley in transit on lakes and canals.

Table 88.—Barley, excluding flour and malt: International trade, average 1925-26 to 1929-30, annual 1927-28 to 1930-31

				Y	ear begir	ning Jul	Z.			
Country	Average 1925–26 to 1929–30		1927	7–28	1928	3-29	1920	)-30	1930	-31 1
	Ex- ports	Im- ports	E1- ports	Im- ports	Et- ports	Im- ports	Ex- ports	Im- ports	Et- ports	Im- ports
PRINCIPAL EXPORT- ING COUNTRIES  United States Rumania <sup>2</sup> Canada Russia Argentina Poland Czechoslavakia Algeria	30, 308 28, 724 319, 609 9, 355 7, 120 5, 301 4, 701	1,400 bushels 0 0 14 0 3 6 90 366 750	1,000 bushels 36,580 25,560 25,131 1,414 11,598 3,044 7,367 6,671	1,000 bushels 0 0 3 0 0 138 64 166	1,000 bushels 51,996 17,550 38,668 8,591 7,989 3,643 6,663	0 0 8 0 102 14 262	1,000 bushels 21,544 63,522 6,396 5,986 12,476 5,293 5,298	6 31 305	1,000 bushels 10, 300 70, 214 16, 603 11, 612 6, 011 6, 252	1,00 <b>0</b> bushels 0 1 0 2 8
Tunis Chile Hungary British India	4, 291 2, 936 2, 611 2, 169	\$477 0 3 	1, 016 2, 478 2, 221 8, 289 8, 488 1, 304 1, 005	1, 309 0 5 0 0 0 0	7, 278 2, 137 1, 280 1, 403 1, 969 1, 332	42 0 2 0 0 0 485	6, 734 1, 859 4, 966 46 650 675 491	79 0 2 0 2 375	621 1, 167 1, 231 261 3, 307 3, 220 100	894 0 7 0 3 0
Australis Yugoslavia 4 Spain Sweden Egypt	531 507 311	379 13 213	573 16 674	1 40 11	414 24 718	319 3 1	330 92 138	18 2 75	* 335 4 5	\$ 0 41 239
Total	154, 015	2, 724	138, 559	2, 112	156, 911	1, 238	136, 496	912	131, 473	1,498
PRINCIPAL IMPORT- ING COUNTRIES										
Germany United Kingdom Netherlands Belgium Denmark Switzerland Austria France Norway Irish Free State Greece Cuba Estoma Italy	790 258 2,891 0 134 1,044 0 430 0 0 0 0 23	83, 542 32, 134 14, 460 13, 586 3, 494 3, 306 8, 163 2, 830 1, 382 885 593 8 260 244 209	711 333 3, 291 315 8, 108 0 612 0 0 0 16	85, 765 34, 033 10, 177 11, 855 2, 281 2, 819 1, 538 1, 314 480 145 171 195 273	1, 159 192 2, 884 0 88 452 0 436 0 0 0	78, 441 81, 418 17, 045 14, 592 1, 630 4, 252 2, 432 5, 483 1, 102 849 603 3 516 128	1,067 311 2,738 0 23 693 0 53 0 0 0 3	102, 528 29, 798 16, 572 16, 506 7, 522 3, 802 3, 800 3, 230 1, 617 1, 067 874	1, 232 2, 201 2, 569 1 36 87 0 42 0 0	35, 233 37, 908 30, 201 21, 564 30, 974 5, 770 4, 471 15, 090 2, 293 595 171
Total	6, 212	160, 088	8, 585	153, 930	5, 587	158, 494	6,888	187, 663	6, 591	185, 573

Bureau of Agricultural Economics. Official sources except where otherwise noted.

<sup>1</sup>Preliminary.
2 Monthly Crop Report and Agricultural Statistics.
3-3-year average.
4 Calendar year.
4-year average.

Table 89.—Barley, No. 2: Weighted average price 1 per bushel of reported cash sales, Minneapolis, 1909-10 to 1931-32

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	7.182	June	July	Weight- ed aver- age
1909-10 1910-11 1911-12 1911-12 1912-13 1913-14 1914-15 1016-16 1916-17 1917-18 1018-19 1919-20 1920-21 1921-22 1922-23 1922-24 1922-25 1922-26 1922-27 1922-28 1923-29 1924-29 1925-29 1926-27 1927-28 1928-29 1929-30 1920-31 1920-31 1920-31 1920-30 192	Cents 45 61 85 46 58 59 59 81 131 102 133 102 58 49 66 80 72 65 62 63 45	Cents 48 63 94 49 61 58 48 133 95 127 99 55 54 66 67 63 63 63 65 54	Cents 49 63 95 56 55 51 103 128 91 128 50 573 63 59 52 50	Cente 52 66 98 45 53 59 56 111 127 94 133 82 54 60 181 63 64 77 62 60 48 51	Cents 57 70 91 45 50 57 61 107 149 92 152 47 61 87 65 67 83 62 67 83	Cents 61 77 105 49 52 68 70 117 156 90 152 93 65 66 54 44	Cents 60 74 100 48 50 75 66 117 188 87 137 65 66 68 94 62 77 70 54 44	Cents 58 81 95 49 70 65 121 212 93 151 67 58 69 70 88 62 72 90 67 54	Centis 54 88 101 46 47 70 68 136 182 109 160 61 64 75 81 63 77 92 65 48	Cen's 54 75 99 50 148 113 174 65 62 61 65 89 60 56 45	Centes 53 77 76 52 47 66 68 138 112 112 157 56 58 84 64 60 50 39	Cente 60 45 68 69 149 118 121 116 62 56 84 67 84 67 85 69 42	Cents 74 74 92 42 42 42 51 65 63 117 149 100 143 55 63 84 67 71 86 67 77 71 86 67 77 71 86 67 77 71 86 77 77 77 77 77 77 77 77 77 77 77 77 77

Bureau of Agricultural Economics. Compiled from Minneapolis Daily Market Record.

Table 90.—Flaxseed: Acreage and production, by States, average 1924-1928, annual 1928-1931

			Acreage				P	roductio	n	
State	Aver- age, 1924- 1928	1928	1929	1930	1931 1	Aver- age, 1924- 1928	1928	1929	1930	1931 1
Visconsin	1,000 acres 10 750 14 4 1,420 546 7 39 202	1,000 acres 9 726 19 7 1,143 554 8 25 183 1	1,000 acres 7 512 13 2 1,421 669 20 23 362 18	1,000 acres 7 742 20 2 1,677 702 28 37 481 36	1,000 acres 7 861 27 2 1,006 185 61 144 14	1,000 bushels 128 7,264 160 27 10,307 4,162 61 256 1,444	1,000 bushels 122 5, 808 198 56 8, 344 3, 601 64 172 1, 556	1,000 bushels 77 4,608 117 10 6,394 3,144 140 1,195 99	1,000 bushels 77, 420 230 14 7, 882 3, 299 154 240 1, 780 144	1,000 busheld 6,02 11 3,52 40 23 33 33
United States.	2,993	2,675	3, 047	3,732	2, 313	23, 816	19, 928	15, 910	21, 240	11,0

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

Average of daily prices weighted by car-lot sales.
 Special No. 2 barley used, August, 1929, to end of table.

<sup>&</sup>lt;sup>1</sup> Preliminary.

Table 91.—Flaxseed: Acreage, production, value, foreign trade, net supply, etc., United States, 1909-1931

		Aver-		Price per bushel	Farm	Price per bushel of No. 1 Flax-	hase	d, includ oil, in te year beg 1 2	me of	
Year	age y	age yield per acre	Pro- duc- tion	re- ceived by pro- ducers Dec. 1	basis Dec. 1 farm price	seed at Minne- apolis, year begin- ning Sept. 1 i	Im- ports	Ex- ports, domes- tic and foreign	Net im- ports	Net supply
1000	1,000 acres	Bushels of 56 lbs.	bushels	Cents	1,000 dollars	Cents	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
1909 1909 1909 1910 1911 1911 1912 1913 1914 1915 1916 1917 1918 1919 1919 1919 1920 1921 1922	2,083 2,467 2,757 2,851 1,645 1,887 1,910 1,261 1,503 1,757 1,108 1,113 2,014	9.52 7.88 7.88 8.41 9.76 4.76 9.35 4.81 9.33 8.22	19, 515 19, 699 12, 718 19, 370 28, 073 17, 853 13, 749 14, 030 9, 164 13, 369 6, 655 7, 178 10, 752 8, 029 10, 375 17, 060	152.8 231.7 182.1 114.7 119.9 126.0 174.0 248.6 296.6 340.1 438.5 176.7 145.1 211.5 210.7	30, 093 29, 472 35, 272 21, 399 17, 318 24, 410 35, 541 27, 182 45, 470 31, 475 18, 999 11, 648 21, 941 35, 951	208 249 214 138 152 170 204 291 378 419 209 219 258 258 244	6,074 12,010 7,848 3,845 9,772 12,729 14,441 10,946 14,042 9,230 26,483 16,174 22,389 20,009 10,557	152 78 126 897 216 571 818 507 467 482 467 219 149 161	5, 922 11, 927 7, 722 2, 948 9, 556 12, 158 14, 128 10, 439 13, 575 8, 748 22, 016 15, 955 23, 240 28, 848 19, 412	25, 621 24, 655 27, 092 31, 021 27, 409 25, 907 28, 158 24, 735 22, 739 22, 117 33, 194 26, 707 31, 209 39, 223 36, 472
1924 1924 1925 1926 1926 1927 1928 1939 1930	3, 469 3, 078 2, 907 2, 837 2, 675 3, 047 3, 732	8.2 9.1 7.3 6.7 9.1 7.4 5.2 5.7 4.8	28, 246 31, 547 22, 424 19, 335 25, 847 19, 928 15, 910 21, 240 11, 018	227. 4 226. 5 194. 0 186. 0 201. 2 284. 3 139. 8 120. 2	71, 728 50, 783 37, 510 48, 079 40, 098 45, 240 29, 684 13, 243	263 252 224 220 233 292 165	12, 849 20, 858 24, 155 18, 177 23, 611 18, 537 9, 940	124 148 112 120 106 109 69	12, 725 20, 710 24, 043 18, 057 23, 505 18, 428 9, 871	44, 272 43, 134 43, 378 43, 904 43, 433 35, 477 33, 553

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board; italic figures are census returns. See 1927 Yearbook, page 809, for data for earlier years.

Table 92.—Flazseed: Yield per acre, average 1919-1928, and annual 1926-1931, and estimated price per bushel December 1, average 1925-1929, and annual 1926-1931, by States

-			Yie	ld per	acre			]	Estima	ted pr	ice per	bushe	l Dec.	1
State	Av., 1919– 1928	1926	1927	1928	1929	1930	1981	Av., 1925- 1929	1926	1927	1928	1929	1930	1931
Wisconsin Minnesota Iowa Missouri North Dakota South Dakota Nebraska Kansas Montana Wyoming United States	Bus. 12.3 9.6 10.4 7.8 6.9 7.9 8.4 6.6 16.9	Bus. 12.0 9.4 11.6 8.0 5.5 5.8 8.7 6.9 4.2	Bus. 13. 2 9. 7 12. 0 6. 5 8. 2 10. 0 10. 0 5. 5 10. 2	Bus. 13.5 8.0 10.4 8.0 7.3 6.5 8.0 6.9 7.0	Bus. 11.0 9.0 9.0 5.0 4.5 4.7 7.0 5.5 3.5 5.2	Bus. 11.0 10.0 11.5 7.0 4.7 5.5 6.5 3.7	Bus. 9.5 7.0 8.0 3.5 2.5 3.5 2.3 2.0	Cts. 217 222 217 206 218 216 212 201 210	Cis. 200 197 195 195 193 190 185 200 185	CZs. 190 192 195 188 184 185 175 185 175	Cts. 199 205 198 190 201 201 190 185 192 195	Cts. 270 287 275 265 287 280 280 234 280 275	Cts. 156 145 155 150 139 133 125 156 131 129	C7s. 123 123 120 100 117 117 95 120 110 115

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> The figures shown, 1903–1920 are averages of daily closing prices compiled from annual reports of the Minneapolis Chamber of Commerce; 1921–1928, are averages of daily prices weighted by car-lot sales, compiled from Minneapolis Daily Market Record.

2 Compiled from Commerce and Navigation of the United States, 1909–1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, 1919, and August issues, 1927–1930, and official records of the Bureau of Foreign and Domestic Commerce. 1 bushel of flaxseed weighs 56 pounds; 1 bushel of flaxseed weighs 56 pounds; 1 bushel of flaxseed weighs 56 pounds; 2 Preliminary.

<sup>1 8-</sup>year average.

Table 93.—Flarseed: World production, 1920-21 to 1931-32

						5	Selecteri	countries			
Year	produc- tion, includ- ing Russia 1	hemis- phere produc- tion, includ- ing Russia	Euro- pean produc- tion. Includ- ing Russia	Argen- tina <sup>2</sup>	Russia	United States	Invila	Canada 	Polanti	Lithu- ania 8	Uru- guay
1920-21 1921-22 1922-23 1922-23 1922-24 1924-25 1925-26 1926-27 1927-23 1928-29 1924-30 1930-31 1931-32	1.000 bushels 110, 811 77, 467 105, 430 136, 284 131, 221 159, 128 153, 945 158, 194 149, 063 122, 056 155, 435	1,000 bushcls 49,638 40,773 56,921 76,983 84,400 81,876 71,080 76,715 68,607 08,683 79,972	1,000 bushels 14,894 14,494 16,813 19,664 23,982 32,931 28,861 29,146 30,530 37,209 37,805	1,000 bushels 60,006 47,577 58,005 45,084 75,113 80,783 82,672 78,377 50,004 70,264 82,672	1,000 bushels 9,204 9,752 11,043 13,379 16,960 23,991 20,577 21,814 23,690 28,060 29,957	1,000 bushels 18,029 10,375 17,060 28,246 31,547 22,424 19,335 125,847 19,928 16,910 21,240 11,018	1,000 bushels 10,800 17,410 21,320 18,520 20,040 16,080 16,240 13,920 12,880 15,200	1.6 A Lushels 7,908 4,112 5,008 7,140 9,65 6,237 5,995 4,885 3,614 2,060 5,049 2,565	1,000 bushels 637 656 1,515 2,120 1,572 2,270 2,472 2,472 2,413 3,002 2,335 1,968	1,620 bushels 1,011 909 1,108 1,056 1,332 1,571 1,545 1,405 1,000 1,718 1,532 1,107	1,000 bushels 90b 519 710 1,175 2,030 1,970 1,974 2,030 3,228 5,056 5,723

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. Production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus for 1930-31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which heritage late in 1930 and accept in 1931. which begins late in 1930 and ends early in 1931.

Table 94.—Flaxseed: Monthly marketings by farmers, as reported by about 3,500 mills and elevators, United States, 1921-23 to 1930-31

## Percentage of year's receipts

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Sea- son
1921-22 1922-23 1923-24 1924-25 1925-26 1926-27 1927-28 1927-28 1929-30 1929-30	6.4 2.5 1.1 1.4 1.0 1.1 1.9 2.2	10. 9 13. 4 10. 0 5. 3 11. 1 12. 0 6. 1 7. 2 19. 9 21. 2	20 7 27. 6 30. 7 23. 0 34. 3 25. 5 32. 9 31. 1 35. 6 32. 5	25. 7 23. 3 27. 3 34. 5 23. 5 32. 5 35. 3 23. 9 18. 7	12.0 11.4 12.1 17.8 12.4 11.2 10.5 11.6 9.0	0.901~033339 0.500505533	3768740132 4.23223212	2.03 2.20 2.23 1.13 1.13	30708 21.8871.9 1.941.09	2.4 2.3 1.5 1.5 1.5 1.0 2.1	2.1 1.6 2.1 1.2 1.7 1.7 1.7 2.2	86033111218 12211118	100, 0 100, 0 100, 0 100, 0 100, 0 100, 0 100, 0 100, 0 100, 0

Bureau of Agricultural Economics.

<sup>&</sup>lt;sup>1</sup> Excludes a few minor producing countries for which no statistics are available and which do not enter into world trade. No production figures for Germany are available.

<sup>2</sup> Figures of a rea harvested are not available for all years but over a 16-year period the harvested area averaged 10 per cent below the sown area.

• Flav and hemp.

Table 95.—Flax: Acreage and production in specified countries, average 1921–22 to 1925–26, annual 1928–29 to 1931–32

			Acreage				Beed	Seed production	lon			Fiber	Fiber production	по	
Oountry	Aver- 8ge, 1921–22 to 1925–26	1929-29	1929-30	1930-31	1931-321	Aver- age, 1921-22 to 1925-26	1828-29 1020-30 1030-81 1981-321	10:30-30	1030-31	981-321	Aver- age, 1921-22 to 1925-26	1928-29	1929-30	1930-31	1931-321
NORTHERN HAMINTERRE NORTH AMERICA Canada United States.	Acres 769, 552 2, 156, 400	-1cres 378, 081 2, 638, 000	.4cres 382, 359 3, 047, 000	Acres 581, 800 3, 732, 000 2,	Acres 627, 785 2, 313, 000	1,000 bushels 6,438 17,877	1,000 bushels 8,614 19,928	1,000 bushels 2,000 15,910	1,000 bushels 5,089 21,240	1,000 bushels 2,565. 11,018	000'I	1,000 spunod	1,000	1,000 pounds	1,000 pounds
Total North America	2, 925, 952	3, 016, 081	3, 429, 359	4	313, 800 2, 940, 785	24, 325	23, 542	17, 970	26,300	13, 583					
EUROPE															
United Kingdom: England and Wales. Northern Ireland	7,801	6, 543 37, 248	6, 403 33, 911	3,900	3,200						12, 123	13, 117	15, 487	12,032	
Irish Free State	×,×		<b>6</b>	3,950		18		2			., 885 885 885 885 885 885 885 885 885 88	7, 25,25 20,		7,070	
Notherlands Belgium France	47, 839 47, 290 46, 508	39, 158 58, 820 83, 703	4,7,8 4,88 4,88 4,88 4,88	37,317 56,000 74,278	38,89 87,89 82,89	25 TE SE		<u> </u>	258 739 739	227	5,4%; 5,000;	30, 623 47, 496 72, 589	24,200 56,216 56,304	22, 957 61, 017	<b>5</b> ,50
Spain. Italy Austria Cacabalowarda	2, 25 2, 25 3, 25 2, 25	43, 660	-,84,24,4 5905 5905	27,2 27,2 2002 2002 2002 2002	A or K	<u> </u>	314 248	-848 -848	**************************************	202	2,7,5,5 3,45,5 3,45,5 3,45,5 3,45,5 3,45,5 3,45,5 3,45,5 3,45,5 4,5 4	4, 676 16, 416 22, 230	20,296 15,996 728	12,555 12,694 18,694 18,694	5, 071 10, 935 8, 344
Hungary Yugoslavia	8,6,8, 8851	31, 100	21,48 34,48 98,48	17,83	<b>(4</b> ;=	8		82	32,		18,465	16,164	20, 912 20, 683	8,2% 8,2% 8,8%	
Bulgaria. Rumania Poland.		47,811 281,889		43,527 285,423	48,4; 88,8; 88,8;	. 4. 28. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5.	જ-	3, 23, 27, 4, 20, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2,	1,335	1,968	410,770 87,774 87,774	11, 978	144, 849 144, 849	5, 933 97, 300	8,1
Latvis 1 Estonis Estonis	132,076	8,8,8,8 8,8,8,8 18,88,8	1,2,5,5 1,2,5,5 1,5,5,5 1,5,5,5 1,5,5,5 1,5,5,5 1,5,5 1,5,5 1,5,5 1,5 1	488 888 888	इंद्र <del>ी</del> स्ट	2, 783 287 287	-£	88	t 188	25.28 25.28	8.84 28.86	32,276 17,195	22,34 24,34 24,34 27,34 27,34 27,34	42, 395 23, 745 3, 745	8,2
Finand Russia, incl. Asiatic		4, 288, 668		5, 551, 102	7, 735,	15,025	23, 690	28,060	29, 957		. <del>2</del> 6	716, 936	816, 804	944, 904	
Total Buropean countries report- ing all years, including Asiatio Russia	3, 766, 761	3, 766, 761 5, 496, 855 6, 230, 997	6, 230, 997	6, 630, 805 8, 617, 188	8, 617, 188	5, 418	4, 292	6,769	2, 199	4, 515	316, 391	361, 977	408, 581	314, 386	215, 884

				ļ		215, 884			1			1	215, 881	
_	<u> </u>			+	+			<u> </u>	_			-		
		1, 702				314, 386	1, 498, 0	1				1	311,3	1, 499, 0
		2, 792			38, 905 1, 052	40%, 581	1, 383, 000						408, 581	, 381, 000
		1,433			29, 532	361, 977	, 237, 900						361, 977	, 228, 700
	1, 090	2,090			61, 212	316, 391	1, 110, 900 1, 227, 900 1, 383, 000 1, 498, 000		\$ 734		۲- چو		316, 391	1, 111, 700 1, 228, 700 1, 384, 000 1, 484, 000
	734			15, 120		33, 962	1			5, 723 82, 672		88, 395	122, 347	1
	844	34		16, 200		44, 156	88, 722			75.05 26.05 26.05 26.05		75, 320	118, 476	122, 750 159, 185
		23		12,880	121	38, 019	69, 377			50,228 50,004	i	53, 232	91, 251	
	437	22.22		13,920	93	42, 191	69, 544		_ i	78,377		80, 407	122, 688	150, 000
- ;	368	33		17,624	304	47, 730	64, 159			[턴		53, 563	101, 293	117, 863
	67,000			3, 020, 000		14,644,973				606,000		9, 216, 000	23,890,973	
-	58,046	2, 411		2, 802, 000 3, 020, 000		13, 804, 151	13, 848, 000			5.231, 000 7, 252, 000'8, 640, 000		7, 063, 851 9, 216, 000	21, 468, 000	21, 522, 000
	42, 239	4, 249		3, 109, 000	25, 950 3, 815	2, 811, 595	2, 856, 000		793	290, 676	7,756	6, 521, 676	8, 333, 271	8, 400, 000
ě	2, 8,8,4	2, 946		3, 311, 000	19,081	1, 866, 536	1, 904, 000			192, 234	2,800		8, 626, 770	8, 670, 000
1	40, 154 98.44	8, 99 181 181		3, 216, 200 3, 311, 000	49,911	9, 949, 757 11, 866, 536 12, 811, 595 13, 804, 151 14,644,973	10, 030, 000 11, 904, 000 12, 856, 000 13, 848, 000		913	116, 279	8, 89,	5, 341, 036 6, 780, 234	16, 200, 768 18, 626, 770 18, 333, 271 21, 468, 000 23, 590, 973	15, 381, 000 18, 670, 000 18, 400, 000 21, 522, 000
NORTH AFRICA	Morogo Morogo Algeria	Tunk Egypt.	ASTA	India.	Japan	Total Northern Hemisphere countries reporting all years	Estimated Northern Hemisphere total	SOUTHERN HEMISPHERE	Chille	Uruguay.	Australia New Zoaland	Total Southern Hemisphere countries reporting all years	Total Northern and Southern Hemisphere countries report- ing all years	Estimated world total 6

Bursan of Agricultural Economics. Official sources and International Institute of Agricultura. Both acreage and production figures refer to the year of harvest, thurst of the Northbrith these of the Southbrith these of the Bouthbrith with the Southbrith these of the Bouthbrith with it is a source are combined with the Bouthbrith and the Bouthbrith hier british in 1930 and and saftly in 1931.

Preliminary.
Flax and hemp.

4-year sverage.
 2-year sverage are degimented sverages are estimates for territory within present boundary.
 Acreage figures are for area sown; figures of area harvested are not available for all years, but over a 16-year period the havrested area for area sown; figures of area harvested are not available for all years, but over a 16-year period the havrested area for area sown; figures or which no statistics are available and which do not enter into world trade. No figures are inclinited for dermany, whose accessed from 118,000 acres in 1921-22 to 10,000 acres in 1931-32. No production figures are available.

Table 96.—Flaxseed: Receipts at Minneapolis, 1909-10 to 1931-32

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aug.	Total
	1.000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	bush.	bush.		bush.	bush.	bush.	bush.		bush.	bush.	bush.	bush.	
1909-10	999	2, 219	1,892	601	966	670	826	437	222	159	123	137	9, 251
1910–11	854	1,530	1, 292		338	300	232	112	118	122	133	191	
1911–12	563 700	1, 212		1, 716	531	459	397	468	571	440	487	160	
1912-13	700	1,657	1,520	2, 245	1, 450	1, 246	1, 057	742	518		432	281	12, 362
1913-14	756	1,686	1,505	1, 131	711	478	592	270	139	165	233	117	7, 783
1914-15	901 347	1,890	1, 247	1,016	599	443	384	142	77	146	239	115	7, 199
1915-16	347	1,038	1,506	1, 113	319	399	810	486	440	363	441	199	
1916-17	316	2,380	1,694	1, 045	544	442	441	384	263	565	325	92	8, 491
1917–18	265	980	1, 112	614	533	553	527	283	349	648	208	94	
1918–19	536	915	857	788	558	473	829	439	436	942	642	196	
1919-20	753	570	568	492	344	368	409	159	295	942 522	554	297	5, 331
1920-21	590	1, 444	861	699	298	269	364	434	578	572	338	289	6, 726
1921-22	580 500 909	1, 144	375	354	308	200	254	196	800	220	157	288	4, 296
1922-23	000	1, 121	580	577	447	249	319	476		481	359	1,019	6, 938
1923-24	2, 654	1, 953	1,308	877	358	250	229	210	296	296	264	2,010	8,964
1924-25		3, 475		1, 375	1, 244	750	671	374	402	442	286	1 004	15, 159
1925-26	3, 331	2, 745		722	375	276	320	357	431	360	294	7,007	11, 148
1926-27	1, 539	2, 905	1, 103	669	415	318	273	169	257	277	145		11, 140
1920-2/	1, 000	3, 894		490	716	495	471	311	439		143		8, 511
1927-28	4, 465		1,065		373	328	328	255		330		1 002	13, 598
1928-29		3, 690		601	180				244	330	180	1,249	12, 310
1929-30	2, 939	1,759	624	403		116	133		390	313	162	2, 430	9, 597
1930-31	2, 295	1, 213	912	472	401	368	449	359	355	511	154	2,110	9,599
1931-32	1, 476	840	321	264									

Bureau of Agricultural Economics. Compiled from annual reports of the Minneapolis Chamber of Commerce.

Table 97.—Flaxseed: Commercial stocks in store, 1926-27 to 1931-32

DOMESTIC FLAXSEED IN UNITED STATES:

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aug.
1926-27 1927-28 1928-29 1929-30 1930-31 1931-32	1,000 bushels 584 317 159 467 745	1,000 bushels 1,593 704 924 1,903 1,383	1,000 bushels 5,353 2,721 1,179 2,202 1,920	1,000 bushels 4,703 1,343 610 1.431 1,585	1,000 bushels 2,684 4,247 1,397 917 1,371	1,000 bushels 2,328 3,542 1,142 867 1,357	1,000 bushels 2,089 2,816 780 740 1,273	1,000 bushels 2,014 2,178 681 696 1,205	1,000 bushels 1,834 1,691 547 589 972	1,000 bushels 1,396 882 398 519 784	1,000 bushels 1,445 781 434 433 786	1,000 bushels 909 615 370 314 672

## CANADIAN FLAXSEED IN UNITED STATES:

	1926-27 1927-28 1928-29 1929-30 1930-31 1931-32	0 1 0 0	0 1 0 0	1 0 0 0	12 0 0 1	14 17 0 0 1	14 18 0 0 1	17 18 0 0 1	17 0 0 0 1	17 0 0 0 1	57 0 0 0 1	11 0 0 0 1	13 1 0 0
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Bureau of Agricultural Economics. Compiled from weekly reports to the grain, hay, and feed market news service. Data are for stocks on the Saturday nearest the 1st day of the month.

<sup>&</sup>lt;sup>1</sup> Includes flaxseed in store in public and private elevators in 42 important markets and also the flaxseed afloat in vessels or barges in the harbors of lake and seaboard ports. Flaxseed in transit either by rail or water, mill stocks, or small private stocks of flaxseed intended only for local purposes, not included.

<sup>2</sup> Includes flaxseed stored at lake and seaboard ports, exclusive of flaxseed in transit on lakes and canals.

Table 98.—Flaxseed: International trade, average 1925-1929, annual, 1927-1930

					Calend	ar year				
Country	Ave 1925-		19	27	19	28	19	29	19	30 1
	Exports	Imports	Exports	Imports	Export	Imports	Exports	Imports	Exports	Imports
FRINCIPAL EXPORT- ING COUNTRIES  Argentina British India Canada Uruguay Lithuania Latvia Morocco Eritrea <sup>3</sup> China Estonia Rumania Tunis	9, 442 2, 828 2, 079	1,000 bushels 0 763 568 0 0 560 0 30 4 0	1,000 bushels 74,595 8,670 2,1195 2,274 985 577 476 178 221 73 107	1,000 bushels 0 968 354 0 0 512 0 0 24	1,000 bushels 76,547 6,835 2,950 2,379 275 379 107 10 12 26	1,000 bushels 0 633 300 0 706 0 0 76	1,000 bushels 63,677 10,005 850 2,175 971 604 359 20 1	1,000 bushels 0 876 1,374 0 0 682 0 0 42	1,600 bushels 46,047 10,455 1,397 792 425	1,030 bushels 0 736 806 0 0 0 0
Total	80, 363	1,921	90, 377	1,858	89, 943	1,715	78, 817	2,974	59, 261	1.848
PRINCIPAL IMPORT- ING COUNTRIES  United States Netherlands Germany United Kingdom France Belgium Italy Sweden Australia 2 Czechoslovakia Denmark Spain Norway Poland Japan Finland Hungary Austria	80 0 20 301 1 0 10 0 275 1 0 275	20, 540 13, 640 13, 439 13, 439 7, 368 4, 051 2, 350 1, 477 855 696 663 602 522 404 222 92	0 148 67 0 18 219 0 0 0 2 2 0 0 14 0 0 15 0 0 10 0 10 0 0 0 0 0 0 0 0 0 0	21, 821 14, 372 16, 715 14, 105 7, 061 3, 637 2, 637 1, 167 825 936 557 523 557 552 363 197 101 13	0 164 67 7 7 0 15 328 0 0 0 0 7 0 0 0 0 0 317 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	17, 579 16, 431 17, 439 13, 854 8, 272 5, 503 2, 588 1, 632 956 857 918 618 881 141 118	0 264 148 0 29 373 2 0 0 19 0 0 0 573 2 0 78	24, 243 14, 1.6 12, 159 111, 170 4, 16, 4, 4 4, 16, 4 2, 3, 4 1, 492 1, 192 576 578 818 828 814 126 17	0 260 47 0 27 121 0 0 0 33 0 0 0 0 54 0 0 256	613 719 637 247 221 141 188 16
Total	926	81, 615	511	86, 009	921	88, 984	1, 488	85, 284	799	58, 762

Bureau of Agricultural Economics. Official sources except where otherwise noted.

Table 99.—Flarsced: Estimated average price per bushel received by producers, United States, 19.23-23 to 1981-82

Crop year	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 13	Mar. 15	Apr. 15	May 15	June 15	July 15	Jug. 15	Weight- ed av- erage
1922-23 1922-24 1924-25 1926-25 1926-27 1927-28 1928-29 1929-30 1930-31 1931-32	Cents 189, 1 208, 4 201, 2 227, 9 211, 3 197, 1 181, 6 285, 4 168, 1 113, 1	199. 4 212. 1 210. 8 228. 9 197. 5 191. 2 198. 1	211. 0 211. 4 222. 7 228. 1 195. 5 184. 2 198. 1 285. 1 133. 6		229. 9 218. 8 271. 8 224. 5 193. 0 188. 4 211. 1 279. 8 131. 7	245. 4 224. 9 275. 3 216. 4 195. 7 189. 9 218. 4 275. 0	261. 6 223. 7 267. 8 202. 9 195. 1 194. 8 219. 2	279. 5 217. 7 244. 7 207. 0 106. 1 198. 4 216. 4 263. 7	273. 1 222. 6 251. 8 205. 4 205. 7 210. 5 214. 7 245. 9	245. 4 213. 1 216 8 203 9 204. 7 209. 0 217. 0 245. 6	228. 8 218. 1 227. 6 208. 7 198. 4 195. 5 233. 2 192. 7	210. 4 210. 2 229. 5 215. 7 203. 7 181. 7 259. 5	212.3 220.7 224.6 205.8 192.0 206.7 286.4

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by monthly marketings. Mean of prices on 1st of month and 1st of succeeding month September, 1923-December, 1923.

Preliminary.
 International Yearbook of Agricultural Statistics.

<sup>4-</sup>year average.3-year average.

Table 100.—Flaxseed, No. 1: Average price per bushel, Minneapolis, 1899-1900 to 1931-32

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aug.	A ver-
	Cents												
1899-1900					145	155	159	168	175	175	163	135	
1900-01	149	170	171	162	165	160	154	168	175	175	185	160	166
1901-02	150	145	142	147	165	170	172	175	175	174	152	142	159
1902-03	131	120	118	119	119	115	112	110	114	107	97	97	113
1903-04	100	98	94	97	106	115	114	112	106	107	119	124	108
1904-05	122	114	116	123	123	127	139	139	142	147	147	142	132
1905-06	104	97	98	104	116	114	113	115	114	111	110	111	109
1906-07	110	111	117	119	120	122	119	116	123	125	118	114	118
1907-08	122	127	113	112	117	116	116	117	123	123	121	129	120
1908-09	123	122	138	145	156	164	164	165	172	177	159	142	152
1909-10	141	157	175	193	218	218	225	238	222	204	234	247	206
1910-11	266	262	261	242	260	268	260	256	247	224	210	234	249
1911-12	247	235	204	206	215	206	206	215	223	225	197	186	214
1912-13	178	160	135	125	129	134	126	129	130	131	138	147	138
1913-14	145	138	135	144	149	153	158	154	156	159	168	164	152
1914-15	151	133	145	154	183	186	191	193	195	176	167	167	170
1915-16	170	186	199	207	231	232	227	213	196	180	196	215	204
1916-17	211	254	278	284	289	281	290	318	333	311	301	346	291
1917-18	338	316	329	340	360	374	408	409	393	386	440	439	378
1918-19	409	359	377	354	341	345	375	388	412	486	594	587	419
1919-20	492	432	483	499	512	509	502	468	453	392	348	323	452
1920-21	323	283	227	206	196	182	178	158	184	186	189	201	209
1921-22	203	181	181	189	213	246	257	270	280	250	259	239	219
1922-23	228	238	218	262	280	304	307	340	294	280	270	234	258
1923-24	238	248	212	246	250	258	219	247	246	244	247	244	244
1924-25	226	210	258	284	315	312	297	279	280	268	219	254	263
1925-26	259	258	256	261	250	243	232	234	230	233	244	238	252
1926-27	233	221	222	224	223	225	222	224	234	225	223	222	224
1927-28	221	213	213	215	224	227	233	236	248	238	221	205	220
1928-29	209	228	235	239	245	255	219	245	245	248	276	279	233
1929-30	323	332	324	322	308	305	292	292	268	271	232	200	292
1930-31	190	180	165	161	157	156	158	157	155	148	164	141	165
1931-32	137	132	146	143	-01		100	-01	200	120	703	727	100

Bureau of Agricultural Economics. The figures shown for 1899-1920 are averages of daily closing prices compiled from annual reports of the Minneapolis Chamber of Commerce; 1921 to date are averages of daily prices weighted by car-lot sales, compiled from Minneapolis Daily Market Record.

Table 101.—Linseed oil: Flaxseed crushed and quantity of oil produced, United States, 1919-20 to 1930-31

		Flav	seed cru	shed			Oi	l produce	đ	
Year beginning October	Octo- ber-De- cember	Janu- ary- March	April- June	July- Septem- ber	Total	October- Decem- ber	January- March	April- June	July- Septem- ber	Total
1919-20 1920-21 1921-22 1922-23 1922-24 1924-25 1925-26 1925-27 1927-28 1928-29 1929-30 1930-31 1	1,000 bushels 7, 684 6, 341 7, 539 8, 602 8, 970 11, 530 11, 798 11, 085 12, 699 11, 1947 7, 391	1,000 bushels 6, 336 6, 713 8, 292 9, 516 12, 516 11, 037 11, 835 10, 839 7, 966 6, 571	1,000 bushels 6, 407 6, 332 3, 441 8, 689 9, 434 9, 128 9, 603 9, 963 7, 270 7, 205	1,000 bushels 6,542 5,583 8,223 7,550 7,850 9,051 7,603 10,321 5,887 7,610	1,000 bushels 26,962 24,828 23,276 33,806 85,529 40,996 40,136 41,795 42,313 31,070 28,777	1,000 pownds 139,960 120,502 137,528 158,753 165,580 211,954 217,992 206,496 208,046 208,273 182,228 131,257	1,000 pounds 117, 226 118, 787 124, 941 155, 148 177, 583 229, 544 194, 607 202, 162 223, 751 202, 353 145, 970 118, 417	1,000 pounds 121,407 118,887 70,239 178,267 176,157 169,980 144,950 167,232 179,532 187,019 130,863 130,635	1,000 pounds 126, 138 107, 716 102, 581 154, 588 139, 862 140, 306 174, 057 169, 274 141, 889 191, 977 108, 236 141, 205	1,000 pounds 504, 731 465, 289 646, 756 659, 192 787, 784 731, 606 745, 164 783, 218 787, 622 567, 297 521, 514

Bureau of Agricultural Economics. Compiled from reports of the Bureau of the Census, "Animal and vegetable fats and oils."

<sup>&</sup>lt;sup>1</sup>Preliminary.

Table 102 .- Linseed oil: International trade, average 1925-1929, annual 1927-1930

					Calend	ar Lear				
Country	Averag	e, 1925– 29	19	27	19	28	192	9	198	101
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Import:
PRINCIPAL EXPORT- ING COUNTRIES  Netherlands United Kingdom Belgium Sweden	49, 400	1,000 pounds 833 47,546 2,308 669	1,000 pounds 150, 621 44, 628 21, 010 1, 189	1,000 pounds 579 47,815 760 560	1,000 pounds 155, 926 49, 327 24, 453 1, 436		1,000 pounds 172, 702 44, 925 29, 806 1, 751	1,000 pounds 1,320 69,418 2,944 912	1,000 pound: 172, 024 35, 157 29, 325 1, 435	1,790 pounds 913 97,442 1,214 312
Total.	232, 300	51, 356	217, 448	49, 714	231, 142	54, 055	249, 184	74, 594	237, 941	99, 911
PRINCIPAL IMPORT- ING COUNTRIES										
Germany Switzerland Brazil Austria France United States Finland Dutch East Indies Australia Egypt Union of South Af-	459 4, 469 2, 350 0	43, 213 13, 285 9, 558 8, 996 8, 195 7, 946 5, 380 5, 161 4, 968 4, 935	5, 525 4 0 629 4, 400 2, 525 0 10 2	44, 057 14, 234 8, 666 8, 937 5, 666 5, 954 5, 034 4, 575 4, 825	10, 842 73 0 510 4, 829 1, 965 0 19	29, 188 14, 771 10, 204 10, 455 7, 033 173 6, 507 5, 505 5, 186 5, 054	14, 277 27 0 363 5, 687 2, 208 0 0 18	42, 216 13, 341 6, 909 9, 148 3, 546 9, 961 4, 795 5, 753 3, 031 4, 686	9, 287 49 0 159 12, 018 1, 592 0 0	33, 931 12, 981 5, 737 9, 104 5, 954 2, 125 5, 843 2 3, 387 1, 154
rica. Hungary. New Zealand. Italy. Norway. Chile. British India. Denmark. Rritish Malays. Bulgaria. Yugoslavia. Czechoslovakia. Czechoslovakia. China. Philippine Islands. Canada. Argentina. Tunis. Greece.	12 2 331 54 0 727 419 126 0 52 257	4,770 4,202 8,783 3,574 3,314 2,712 2,082 1,550 1,389 1,389 1,210 819 743 419	0 15 0 427 17 0 547 314 109 0 8 40 0 53 23 23	4, 239 6, 398 2, 869 4, 227 3, 148 2, 639 1, 885 1, 972 1, 551 1, 758 1, 758 1, 008 801 1, 155 733 587 629 280	0 1 0 165 283 0 576 1, 197 1116 0 31 111 0 533 128 0 0	5, 082 5, 700 3, 697 7, 446 7, 191 2, 533 2, 2, 379 1, 961 1, 633 1, 1, 550 1, 550 734 452	0 0 0 203 168 0 1, 259 441 177 0 4 1, 155 0 0 18 65	5, 014 1, 263 3, 525 4, 312 8, 474 1, 871 1, 675 1, 636 1, 342 746 733 301	0 989 0 244 0 922 3 85 0 1 514 0 0 33 35 0	4, 441 1, 192 2, 892 2, 205 1, 703 2, 605 1, 354 1, 350 1, 354 1, 358 903 1, 621 1, 109 646 942 263

Bureau of Agricultural Economics. Official sources except where otherwise noted. Conversions made on the basis of 7.5 pounds to the gallon.

14, 863 140, 250 20, 045 138, 186

Total\_\_\_\_

26, 072 139, 758

25, 931

109, 052

18, 051 149, 065

Table 103.—Linseed oil, raw: Average car-lot price per gallon in barrels, New York, 1922-23 to 1931-32

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Aver- age
1922-23 1923-24 1924-25 1924-25 1925-27 1927-28 1928-29 1928-20 1929-30 1930-31 1931-32	Cents 88 90 102 103 83 77 74 116 78 57	Cents 89 94 102 1 99 81 74 76 118 74 55	Cenis 88 92 106 96 81 73 77 111 70 56	Cents 89 92 110 95 80 72 75 110 68 53	Cents 89 92 117 87 79 74 75 105 66	Centa 95 91 116 85 78 74 76 105 69	Cents 102 93 111 80 77 74 76 105 71	Cents 116 90 104 81 81 74 76 106 68	Cents 115 94 105 81 84 78 77 105 66	Cents 112 94 106 84 84 77 79 105 64	Cents 104 98 98 89 80 75 92 104 68	Cents 97 102 102 90 80 73 96 97 63	Cents 99 94 107 89 81 75 79 107 69

Bureau of Agricultural Economics. Compiled from Oil, Paint, and Drug Reporter, average of weekly ranges. Data for 1910-11 to 1921-22 are available in the 1930 Yearbook, p. 666, Table 103.

<sup>1</sup> Preliminary.
2 Java and Madura only.

<sup>3</sup> International Yearbook of Agricultural Statistics.

ava and Madura only. 2-year average.

<sup>&</sup>lt;sup>1</sup> Beginning October, 1925, prices are quoted on pound basis and have been converted to price per gallon by multiplying by 7.5.

Table 104.—Linseed meal: Average wholesale price per ton, Minneapolis, 1922-23 to 1931-32

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Aver- age
1922-23 1923-24 1923-25 1925-26 1925-26 1926-27 1927-28 1928-29 1929-30 1930-31 1931-32	Dolls. 43. 32 52. 21 48. 08 47. 78 47. 83 49. 50 49. 75 59. 57 45. 75 28. 19	50. 46 52. 78 50. 00 46. 96 46. 56 48. 46 57. 33 60. 00 43. 83	48. 86 47. 35 46. 11 48. 00 59. 00 59. 31 42. 45	54. 88 49. 76 50. 58 48. 72 46. 91 48. 00 61. 43 58. 66 42. 06	57. 62 49. 31 51. 31 50. 09 47. 76 50. 92 60. 85 57. 66	55. 23 45. 74 49. 91 52. 70 48. 12 52. 00 63. 29 55. 80	49. 19 45. 10 45. 08 50. 37 51. 31 53. 30	47. 00 43. 20 43. 68 52. 44 51. 82 54. 06 58. 52 58. 56	45. 81 42. 58 45. 96 53. 60 50. 84 57. 44 58. 99 52. 41	41. 88 44. 44 47. 63 50. 69 49. 12 55. 33 55. 39 48. 48	43. 84 47. 16 47. 98 50. 86 48. 00 52. 82	49. 28 48. 73 49. 08 49. 54 48. 72 49. 17 56. 31 45. 69	49 35 47.66 48.18 50.09 48.59 51.58 58.20 54.72

Bureau of Agricultural Economics. Compiled from the Minneapolis Daily Market Record. Prices are simple averages of daily quotations. Data for 1909-10 to 1921-22 are available in the 1930 Yearbook, p. 667, Table 104.

Table 105.—Rice, rough: Acreage, production, value, exports, etc., United States, 1909-1931

						but in broker	cluding ri	ostly clea ice bran, i uced to rou July <sup>1</sup>	ned rice, neal, and ugh basis,
1,00 aci	Acreage	Average yield per acre	Produc- tion	Price per bushel received by pro- ducers Dec. 1	Farm value, basis Dec. 1 farm price	Domes- tic ex- ports	Ship- ments from United States to Alaska, Hawaii, and Porto Rico	Imports	Net bal- ances <sup>2</sup>
1909	1,000 acres 610	Bushels of 45 lbs.	1,000 bushels 21,839	Cents	1,000 dollars	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
1909 1910 1911 1912 1913 1914 1915 1916 1917 1918 1918 1919 1918	610 723 696 723 827 694 803 869 981 1, 119	35. 8 33. 8 32. 9 34. 7 34. 1 36. 1 47. 0 35. 4 58. 8	20, 607 24, 510 22, 934 25, 054 25, 744 23, 649 28, 947 40, 861 31, 739 38, 606 35, 351	79. 5 67. 8 79. 7 93. 5 85. 8 92. 4 90. 6 88. 9 189. 6 191. 8	16, 392 16, 624 18, 274 23, 423 22, 090 21, 849 26, 212 36, 311 65, 879 74, 042	9C4 1, 082 1, 420 1, 401 807 2, 789 4, 391 6, 529 7, 069 6, 953	4, 276 4, 606 4, 890 4, 806 5, 244 4, 640 5, 191 5, 818 4, 878 5, 995	8, 114 7, 516 6, 842 7, 996 10, 447 9, 979 9, 516 7, 778 16, 418 13, 094	-2,581 -1,605 -157 -1,332 -3,756 -419 +2,651 +6,167 -1,148 +7,638
1920	1, 063 1, 336 921 1, 055 895	39. 5 39. 0 40. 8 39. 2 37. 7	41, 985 52, 066 37, 612 41, 405 33, 717 29, 526	206. 6 119. 1 95. 2 93. 1 110. 2	111, 913 62, 036 35, 802 38, 562 37, 150	17, 402 15, 871 19, 494 13, 344 8, 199	5, 547 6, 614 7, 179 8, 290 9, 094	6, 477 3, 485 2, 650 2, 503 1, 376	+19, 948 +21, 217 +25, 952 +20, 308 +16, 416
1924 1925 1926 1927 1927 1929 1930 1930 1931	7/4 850 883 1, 034 1, 003 956 860 959 970	37. 9 37. 7 41. 1 44. 6 45. 4 47. 2 46. 2 46. 4	32, 206 33, 249 42, 477 41, 754 43, 440 40, 604 44, 299 45, 014	138. 6 153. 8 109. 6 92. 9 88. 5 100. 2 78. 2 60. 9	44, 644 51, 142 46, 544 41, 598 38, 456 40, 666 34, 631 27, 402	4, 033 1, 734 10, 957 11, 152 14, 137 10, 423 10, 116	8, 152 8, 049 8, 743 9, 183 10, 131 10, 342 11, 864	2,076 4,747 2,558 1,588 1,325 1,124 1,278	+10, 687 +5, 535 +17, 587 +19, 035 +23, 403 +19, 795 +20, 829

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board; italic figures are census returns. See 1927 Yearbook, p. 819, for data for earlier years.

Compiled from Commerce and Navigation of the United States, 1909–1917; Foreign Commerce and Navigation of the United States, 1919; Monthly Summary of Foreign Commerce of the United States, June issues, 1919–1928; January and June issues, 1927–1931, and official records of the Bureau of Foreign and Domestic Commerce.

The difference between the total exports (domestic exports plus reexports plus shipments to Alaska, Hawaii, and Porto Rico) and total imports. Net exports indicated by +; net imports indicated by -.

Table 106.—Rice, rough: Acreage and production, by States, average 1924-1928, annual 1928-1931

			Acreage			ı	P	roductio	n	
State and division	Aver- age, 1924- 1928	1928	1929	1930	19311	Aver- age. 1924- 1928	1928	1925	1920	16.
Arkansas Louisiana Texas	1,000 acres 175 472 160	1,000 acres 164 487 163	1,000 acres 156 4+5 144	1,000 acres 172 491 135	1,900 acres 177 471 197	1,0°9 buz`els 8,047 16,914 6,972	1,000 tuskels 7, 828 18, 806 8, 170	1,079 bushels 7,956 18,832 7,103	1,000 bushels 8, 170 19, 140 9, 769	1,0 1, bushe's 9,351 17,192 10,411
United States, ex- cept California California	807 127	814 132	705 95	849 110	845 125	81, 993 6, 875	34, Sc9 8, 171	34, 391 6, 213	37, 028 7, 271	37, 01 1 5, 6, 0
United States	934	946	860	959	970	<b>88, 850</b>	43, 010	40, 604	44, 299	17, 614

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

TABLE 107.—Rice, in terms of clean rice: World production, 1909-10 to 1931-34

	Esti- mated	i		Producti	on in sel	ected co	untries 1		
Crop year	world produc- tion, evelu- sive of China	India	Japan	Indo- China	Java and Ma- dura a	Siam 3	Chosen	Philip- pines	United ≺tates
1900-10. 1910-11. 1911-12. 1912-13. 1913-14. 1914-15. 1916-16. 1916-17. 1917-18. 1918-19. 1919-20. 1920-21. 1921-22. 1922-23. 1123-24. 1924-25. 1925-26. 1920-27. 1927-29. 1928-29. 1928-29. 1928-29. 1928-29. 1928-29. 1928-29. 1939-30.4. 1930-31.4.	pounds 107, 000 103, 000 109, 000 113, 000 113, 000 124, 000 122, 000 123, 000 127, 000 127, 000 127, 000 127, 000 127, 000 127, 000	Million pounds 61,869 64,555 61,109 73,521 80,521 8	Million pounds 10, 474 14, 670 16, 246 15, 778 17, 909 17, 569 17, 184 19, 107 17, 335 19, 087 17, 418 17, 488 17, 488 17, 488 17, 488 17, 488 17, 488 17, 488 17, 488 17, 488 17, 488 17, 488 18, 799 21, 799	Affilion pounds 6, 614 8, 051 9, 521 7, 521 7, 521 7, 6, 33 6, 313 6, 33 7, 623 7, 206 7, 801 7, 991 7, 206 7, 801 7, 8, 255 8, 850 7, 811 8, 095 7, 990	Million pounds 5,723 5,723 5,170 5,842 6,170 6,409 6,743 6,409 6,743 7,435 6,562 7,677 7,103 7,200 6,853 7,007 6,853 7,007 7,103 7,200 6,853 7,200 6,853 7,200 7,2	Million pounds 3,754 4,533 4,594 4,786 4,786 4,786 4,786 5,011 5,114 5,906 6,779 6,261 6,232 5,313 6,620	Million 20,143 3,243 3,413 3,413 4,439 4,437 4,265 4,977 4,641 4,639 4,500 4,767 4,163 4,500 4,767 4,163 4,602 6,026 4,999	M.illon pounds 1, 164 1, 267 1, 164 1, 267 1, 404 1, 100 1, 745 2, 213 2, 506 2, 631 2, 766 2, 818 2, 566 2, 818 3, 083 3, 083 3, 083 3, 184 2, 923	MF."c \(\gamma\) pound \(\gamma\) 572 683 696 671 687 696 1, 135 963 1, 077 1, 166 1, 144 1, 158 937 899 924 1, 186 1, 123 1, 123 1, 123 1, 123

Burean of Agricultural Economics. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus, for 1930-31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931. Estimates of world rice production for the period 1900-1901 to 1909-10 appear in Agriculture Yearbook, 1924, p. 653.

<sup>1</sup> Preliminary.

<sup>1</sup> China is an important producing country, but official statistics are not available.

<sup>2</sup> Irrigated rice.

<sup>•</sup> Integrating the strength of the property of the property of the property of the property of the pears 1920-21 to 1923-24, for which years official estimates have been published of acreage, yield, and total production.
• Preliminary.

TABLE 108,—Rice: Acreage, yield per acre, and production in specified countries, average 1921–22 to 1925–26, annual 1928–29 to 1931–32

		V	Астевде				Yiel	Yield per acre	ø		Produ	ction, in	Production, in terms of cleaned rice	cleaned	rice
Oountry	Average, 1921-22 to 1925-26	1928-29	1929-30	1930-31	1931-321	Average, 1021-22 to 1925-26	1928-29 1929-30		1930-31	1931-321	Average, 1921–22 to 1925–26	1028-20	1929-30 1930-31		1931-321
NORTHERN HEMISPHERE United States. Moxico. Hawali Central America. South America. and West	1,000 acres 921 935 1 95	1,000 acres 956 1112 3	1,000 acres 860 87	1,000 acres 959 90	1,000 acres 970	Pounds 1, 075 2 811	Pounds 1, 263 1, 009	Pounds 1, 312 1, 057	Pounds 1, 284 1, 133	Pounds 1, 2%	Million pounds 990 \$ 77	Million pounds 1, 207 1113 10	Million pounds 1, 128 92	Million Pounds 1, 231 102	Mallion Pounds 1, 250
Indies: Guakemala. Salvador. Costa Rica. Colombia. British Guitana. Durch Guitana.	13 13 442 453	w 5386	5 14 63	8		4 278 4 600 1, 150	125 1,448 600	1, 460	1,417		* 17 * 4 * 5 * 5 * 5 * 5 * 5 * 5 * 5 * 5 * 5 * 5	2 2222	888	288	
Trinidad and Tobago. Burope: Burope: Fortugal. Fortugal. Yugoslayla. Yugoslayla. Burgarla.	8.8 11.6 12.8 31.6 4.4	121 233 233 418 1818	0 11 88 42	0 120 88 171	113 87 846 14	8, 270 1, 222 2, 807	3,289 844 2,680 1,278	3, 471 3, 912 2, 705 1, 273	3, 542 944 2, 453 1, 412	3, 204	376 22 729 729	398 23 23 23 23	8 413 31 917 28	e 24 28 e 2	362 859
French West Africa: French Guinea French Genegal Upper Volta Siera Leone	2,008 119 144 890 192	1,977 111 297 284	77 13 297 827	74 297 859		4 551 546 \$ 136 797 1,586	651 632 1, 186 1, 731	697 1, 186 1, 722	1, 256 1, 699		41,106 65 86 311 295	1,089 69 362 467	46 352 563	44 873 610	
Asin: India. Andaman and Nicobar British North Borneo. British North Borneo. French establishments in India.	81,400 83 82 13	83, 273 4 77 5 47	80, 479 79 79 48	81, 986	81, 209	677	865 597 574	430	863		70, 270 3 42 3 2 29	72, 005 22 22, 27	85,4% 4% 4%	70,771	
Japanese Empire— Japan. Chosen (Kores). Talvan (Formoss). Franch Indo-China. Slam. Federsted Malay States.	7,705 3,824 1,262 11,949 6,964	7,822 3,720 1,447 13,722 6,836	7, 848 4, 000 1, 403 13, 889 6, 041	7,940 1,518 1,518 14,343 7,189	4, 100	2, 350 1, 191 1, 384 1, 384 1, 017 629	1,1422 1,475 1,475 869 803	2, 384 1, 076 1, 451 1, 451 880 735	2,584 1,479 1,625 921	1, 219	18, 107 1, 747 1, 747 7, 704 6, 066	18, 945 4, 245 2, 135 7, 811 6, 325 106	18, 709 4, 304 2, 036 8, 005 5, 315	20, 516 6, 026 2, 315 7, 990 6, 620	17, 346

1111	1111	11111	7, 480
			: [
2,928		7, 221 (887 7, 908	8, 591
8,073 8,184 2,928	1, 302 8 837	6,853 596 7,448 18	6, 732 6, 790 80, 000 127, 000
3,073 5,073 5,83	1, 140 9 97 984	7,006 662 7,668 13	6, 732 130, 000
2,744	5 1, 083 10 6 1, 322	6,616 440 7,065 10	6, 685 6, 732 6, 700 8, 561 128, 000 129, 000 127, 000
			1,351
		948 678 898	1, 554
3872	622	828 852 880	1, 272
1,089 20,089 089	530	929 584 880	1, 308
1, 658	1, 004 1, 188 1, 018 1, 018	927 102 880	5, 543 1, 285 1, 208 1, 272 1, 554 1, 351
	13		5, 543
		7, 017 1, 188 8, 805	5, 530
4,479 838	143 1, 383	7, 384 1,077 121 121	5, 340
4, 387, 4, 834, 834	2,718 7 160 1,278	7,648 1,173 8,716 12	5, 148
4, 229 739 799	4 1, 029 16 27 8 1, 298	7, 136 879 8, 014	5, 187
Uniederated Malay States. Stratis Settlements Philippine Islands Ceylon.	Brazil Brazil Brazil Bagian Congo. Madagasan	Frigated. Trigated. Nontrigated. Tyota, Java and Medura. Fill Islands.	Total, countries reporting acreage and moducition, all periods. Estimated world fotal exclusive of Ohna.

Bureau of Agricultural Economics. Both acrosge and production figures refer to the year of harvests of the Northern Hemisphere countries in combined with the Southern Hemisphere which immediately follow; thus, for 1936-31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931, 42-year average.

1 year only. 2 3-year average. Preliminary.

4-your avorage.

Table 109.—Rice, rough: Yield per acre, average 1919-1928 and annual 1926-1931, and estimated price per bushel December 1, average 1925-1929 and annual 1926-1931, by States

			Yie	ld per	acre			)	Estima	ted pri	ice per	bushe	l Dec.	1
State	Aver- age, 1919- 1928	1926	1927	1928	1929	1930	1931	Aver- age, 1925- 1929	1926	1927	1928	1929	1930	1931
ArkLaTexCalif	Bus. 46. 6 35. 6 38. 9 54. 0	Bus. 53. 0 32. 5 41. 5 53. 6	Bus. 44. 0 40. 0 48. 6 56. 0	Bus. 47.7 38.8 50.0 61.9	Bus. 51. 0 40. 5 52. 8 65. 4	Bus. 47. 5 39. 0 52. 2 66. 1	36. 5 53. 0	107	Cts. 100 105 110 131	Cts. 90 87 86 115	Cts. 86 90 88 88	Cts. 94 100 103 105	Cts. 78 76 79 83	Cts. 61 63 61 56
T. 8.1	40. 5	41.3	44.6	45. 4	47.2	46. 2	46. 4	109. 0	109.6	92.9	88. 5	100.2	78. 2	60. 9

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

Table 110.—R.ce, rough: Receipts at mills in Texas, Louisiana, Arkansas, and Tennessee, by months, 1922-23 to 1931-32

Crop Tear	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Мау	June	July
1922-23 1923-24 1923-25 1925-26 1925-27 1928-29 1928-29 1929-30 1930-31 1930-31 1931-32	1,000 bbls. 340 177 298 457 188 530 180 584 508 228	1,000 bbls. 909 394 949 853 1,147 1,167 1,197 1,388 1,084 1,442	1,000 bbls. 1,913 1,512 2,182 925 1,681 1,719 2,113 2,330 2,063 1,810	1,000 bbls. 1,780 1,911 1,905 1,131 1,253 1,266 1,936 1,936 1,416 1,257	1,000 bbls. 1,272 966 973 1,672 1,053 831 947 797 844	1,000 bbls. 952 1,076 448 1,019 818 853 621 870 1,147	1,000 bbls. 392 580 197 477 648 805 592 961 864	1,000 bbls. 396 370 43 210 621 942 439 284 601	1,000 bbls. 529 80 34 194 372 620 429 146 566	1,000 bbls. 137 14 11 119 396 352 232 172 520	1,000 bbls. 185 9 45 106 430 130 191 48 323	1,000 bbls. 104 6 8 74 147 17 120 21

Bureau of Agricultural Economics. Compiled from monthly reports of the Rice Millers' Association,

Table 111.—Rice, Blue Rose, clean: <sup>1</sup> Average wholesale price per 100 pounds, New Orleans, 1922-23 to 1931-32

Стор уеаг	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aver- age
1922-23 1923-24 1924-25 1925-26 1925-26 1926-27 1927-28 1928-29 1929-30 1930-31 1931-32	Dolls. 4. 10 3. 78 5. 98 6. 62 4. 94 4. 12 4. 12 4. 25 4. 06	Dolls. 4.25 4.00 5.69 6.31 5.62 4.12 3.72 4.12	Dolls. 3. 62 4. 88 5. 12 5. 69 4. 81 3. 84 3. 91 3. 78 3. 75	Dolls. 3. 82 4. 66 5. 50 6. 34 4. 44 3. 62 3. 81 3. 88 3. 50	Dolls. 4.00 4.38 6.10 6.41 4.38 3.69 3.94 3.84 3.46	Dolls. 4.06 4.62 6.30 6.31 4.50 3.75 4.12 4.00	Dolls. 3. 94 4. 69 6. 50 6. 59 4. 19 3. 66 3. 88 4. 12	Dolls. 3. 91 5. 06 6. 38 6. 25 4. 34 3. 62 3. 88 4. 31	Dolls. 4.00 5.06 6.34 6.19 4.06 3.50 3.88 4.31	Dolls. 3.56 5.88 6.50 5.60 4.12 4.12 3.75 4.56	Dolls. 3.75 6.12 6.81 5.94 4.52 4.28 3.81 4.31	Dolls. 3.94 6.19 6.88 5.94 4.22 4.12 3.94 4.31	Dolls. 3. 91 4. 94 6 17 6. 18 4. 51 3. 87

Bureau of Agricultural Economics. Compiled from annual reports of the New Orleans Board of Trade.

<sup>1</sup> The term "clean" is equivalent to "milled."

<sup>&</sup>lt;sup>1</sup> Prior to 1929, 5 States, including Missouri.

Table 112.—Rice, including flour, meal, and broken rice: International trade, average 1925-1929, annual 1927-1930

					Calend	ar year				
Country	Ave 1925-		19	27	19	28	19	29	193	0 1
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORT- ING COUNTRIES British IndiaIndo-China	Million pounds 4,888 3,435	Million pounds 224 0		Million rounds 148 0	Million pounds 4,024 3,885	Million pounds 553 0	Million pounds 4,600 2,921	Million pounds 194 0		Million pounds 160
Siam <sup>2</sup>	3, 101 438 252 115	1 3 60 0 59	3, 820 579 310 117 83 23	0 2 48 0 33 0	3, 289 424 379 131 169 25	0 6 37 0 31 0	2, 514 431 386 86 163 16	0 6 31 0 36	2, 210 468 259 125 112 14	13 28 0 25 0
Total		347	13, 556	231	12, 326	627	11, 117	267	9, 050	228
PRINCIPAL IMPORT- ING COUNTRIES										
China	51 0 14 325 169 0 224 15 1 0 0 0 4	2,024 1,960 1,303 1,045 961 848 532 269 147 139 112 129 922 59	11 693 33 0 12 294 170 0 203 17 2 0 0 0 0 0 0 0 0 203 0 0 0 0 12 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2,812 2,185 1,037 1,051 1,300 486 262 267 28 154 149 131 120 101 59	4 659 30 0 9 280 256 0 187 14 2 0	1,688 2,091 1,289 1,091 623 883 631 514 225 250 97 117 116 116 102 62	4 545 28 40 256 217 0 211 13 1 0 0 0 0 0	1,443 2,079 1,621 1,100 401 1,556 562 453 247 258 232 146 103 121 107 63	4 490 \$23 97 159 190 0 216 14 1 0 0	2, 652 2, 106 1, 548 1, 079 357 550 534 443 242 247 24 159 114 98 105 61
Dominican Republic Yugoslavla Greece Chile Canada Australia i Brazil Finland Denmark Gambla Barbados Algeria Hungary	0 0 0 1 0 14 0 0	58 55 52 43 40 36 36 24 18 15 13	0 0 0 0 1 0 37 0 0 0 0 0 2 5	68 54 55 44 43 46 0 31 23 18 18 18	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	63 71 53 47 47 21 5 44 25 26 14 13	0 0 0 0 0 2 0 15 0 0 0 0 2 3 3	61 55 54 42 45 2 37 27 20 17	0 0 0 1 0 84 0 0 0	48 47 54 52 43 
Total		10, 933	1, 484	11,760	1, 451	10, 508	1,310	10, 102	1, 282	9, 662

Bureau of Agricultural Economics. Official sources except where otherwise noted. Mostly cleaned rice. Under rice is included paddy, unhulled, rough, cleaned, polished, broken, and cargo rice, in addition to rice flour and meal. Rice bran is not included. Rough rice, or paddy, where specifically reported, has been reduced to terms of cleaned rice at the ratio of 182 pounds of rough or unhulled to 100 pounds of cleaned. "Rice, other than whole or cleaned rice," in the returns of the United Kingdom is not considered paddy, since the chief sources of supply indicate that it is practically all hulled rice. Cargo rice, a mixture of hulled and unhulled, is included without being reduced to terms of cleaned. Broken rice and rice flour and meal are taken without being reduced to terms of whole cleaned rice.

<sup>&</sup>lt;sup>1</sup> Preliminary.

Fremmary.

Year ending Mar. 31 of following year.

Java and Madura only.

International Yearbook of Agricultural Statistics.

<sup>5 3-</sup>year average.

Table 113.—Buckwheat: Acreage, production, value, exports, etc., United States, 1919–1931

		Average	Produc-	Price per bushel received	Farm value, basis	Foreign to year	ade, inclu- beginning	iing flour, July <sup>1</sup>
Year	Acreage	yield per acre	tion	by pro- ducers Dec. 1	Dec. 1 farm price	Domestic exports	Imports	Net balance 2
1919	1,000 acres 743	Bushels of 48 lbs.	1,000 bushels 12,690	Cents	1,000 dollars	1,000 bushels	1,000 bushels	1,000 bushels
1919 1919 1920 1921	743 714 638	17.3 16.7 18.5	12, 327 11, 924 11, 777	145. 9 127. 3 80. 9	17, 984 15, 153 9, 532 10, 385	245 399 485	160 336 113	+85 +63 +372 -114
1922 1923 1924	728 692 717	16.2 16.9 16.8	11,776 11,682 12,004	88. 2 93. 2	10, 385 10, 870	172 92	286 322	-114 -230
1924 1925 1926	737 742 683	17. 0 16. 9 16. 2	12,508 12,540 11,079	102. 4 88. 6 88. 1	12, 806 11, 116 0 764	191 79 66	546 88 86	-355 -9 -20
1927 1928 1929	758 672 627	16.8 15.0 13.9	12, 766 10, 069 8, 692	82.9 86.7 96.9	9, 764 10, 583 8, 727 8, 426 5, 814	554 229 22	74 79 171	+480 +150 -149
1930 1931 <sup>3</sup>	578 502	12.2 17.7	6, 962 8, 875	83. 5 42. 4	5, 814 3, 765	85	426	-311

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board, revised, 1919 to 1928. See introductory text; italic figures are census returns. See 1927 Yearbook, p. 825, for data for earlier years.

Table 114.—Buckwheat: Acreage harvested and production, by States, average 1924-1928, annual 1928-1931

		Acre	age harv	ested			P	roductio	n	
State and division	Aver., 1924- 1928	1928	1929	1930	1931 1	Aver., 1924- 1928	1928	1929	1930	1931 ¹
Maine	1,000 acres 13 2 199 2 201 417	1,000 acres 11 2 171 1 176 361	1,000 acres 12 2 175 1 172 362	1,000 acres 10 2 186 1 167	1,000 acres 9 2 158 1 162 332	1,000 bushels 297 47 3,544 39 3,767 7,694	1,000 bushels 242 48 2,650 20 2,992 5,952	1,000 bushels 246 38 2,625 18 2,580 5,507	1,000 bushels 180 38 2,883 18 1,754 4,873	1,000 bushels 158 36 2,844 21 3,483 6,542
Ohio Indiana Illinois Michigan Wisconsin Minnesota Iowa Missouri North Dakota South Dakota Nebraska	25 14 5 45 24 80 7 1 14 18 1	252588861481	32 15 5 34 20 57 9 1 15 22 1	24 14 4 18 19 51 4 1 15 11	24 13 4 18 11 31 3 1 9 6	444 178 76 574 318 911 102 11 186 223 11	462 150 70 513 288 924 60 9 304 336	480 198 75 320 240 570 121 10 111 198	336 182 48 135 209 459 52 11 60 77	480 234 50 1°0 110 264 25 10 54 30 8
North Central  Delaware Maryland Virginia West Virginia North Carolina	234 2 7 17 28 6	248 1 7 20 25 5	211 1 7 14 23 5	162 1 7 12 17 4	121 1 7 13 20 4	3, 033 18 147 237 506 85	3, 126 12 133 270 450 68	2, 332 13 129 186 409 68	1, 576 8 98 108 212 48	1, 448 13 154 196 410 60
South Atlantic Kentucky	61	<u>58</u>	50	41	45	992	933	805	474	833 25 27
Tennessee	2	2	2 2	2 2	2 2	27	28	27	25	
South Central United States	718	672	<u>4</u>	573	502	73 11, 792	10,069	8, 692	6, 962	8, 875
		0,2	927	0.0	002	,	20,000	0,002	0, 002	0,010

Burean of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

<sup>1</sup> Compiled from Monthly Summary of Foreign Commerce of the United States, June issues, 1919–1926; January and June issues, 1927–1931 and official records of the Bureau of Foreign and Domestic Commerce. Buckwheat—imports for consumption, 1909–1924—general imports, 1925–1930; buckwheat flour imports for consumption 1909–1930. Buckwheat flour converted to terms of grain on the basis that 1 barrel of flour is the product of 7 bushels of grain.

2 The difference between total exports (domestic exports plus reexports) and total imports. Net exports indicated by +; net imports indicated by -.

3 Preliminary.

<sup>!</sup> Preliminary.

Table 115.—Buckwheat: Yield per acre, average 1919-1928 and annual 1926-1931, and estimated price per bushel December 1, average 1925-1929, and annual 1926-1931, by States

			Yie	ld per	acre		,	Est	imate	d pric	e per	bush	el De	e. 1
State and division	Av. 1919– 1928	1926	1927	1928	1929	1930	1931	Av- er- age, 1925- 1929	1926	1927	1928	1929	1930	1931
Maine	19.4	23. 0 23. 0 17. 5 18. 0	23. 0 26. 0 18. 5	22. 0 24. 0 15. 5 20. 0	18.8 15.0 18.0	18.0 19.0	17.5 18.0 18.0 21.0	91 97 90 96	Cts. 83 85 89 100 89	Cts. 90 96 84 84 85	90 92	C78. 90 110 100 105 100	Cts. 80 85 80 94 89	Cts. 60 75 41 46 40
North Atlantic	18.5	17. 5	19.7	16. 5	15.2	13.3	. 19. 7	90. 4	88.8	84.8	89. 6	99.6	83, 3	41, 1
Ohio	13. 4 15. 0 13. 0 12. 8 11. 7 14. 8 11. 6 11. 9	17. 0 13. 0 13. 0 13. 0 12. 5 13. 0 12. 5 15. 0 12. 5	13. 5 16. 2 11. 5 13. 5 11. 0 14. 5 14. 5 14. 5	12. 5 14. 0 13. 5 12. 5 10. 5 10. 0 9. 0 14. 5 12. 0	13. 2 15. 0 9. 4 12. 0 10. 0 13. 4 9. 5 7. 4 9. 0	12.0 7.5 11.0 9.0 13.0 11.0 4.0 7.0	18.0 12.5 10.0 10.0 8.5 9.5 10.0 5.0	89 93 83 85 76 88 92 69 71	95 95 92 80 87 75 82 85 80 80 60	86 85 85 80 82 70 85 90 64 85	87 85 90 79 83 76 90 95 68 67 85	92 95 98 85 93 84 95 100 73 74 85	89 88 85 89 50 50 50 50 50 50 50 50 50 50 50 50 50	41 39 45 44 50 36 60 40 37 28 65
North Central	13, 5	13. 5	12.8	12.6	11, 1	9.7	12.0	81. 2	82. 5	75. 2	78.1	87. 4	78.5	41.0
Delaware	19.8 13.5 18.4	10. 0 19. 0 15. 5 18. 5 15. 5	22.0 14.5 20.5	19.0 13.5 18.0	18.4 13.3 17.8	14.0 9.0	22.0 15.1 20.5	98 98 101	90 100 95 100 100	95 93 93 97 100	95 95 97	100 100 99 110 107	95 95 98 106 98	45 47 55 56 58
South Atlantic	16.4	17.2	18.2	16.1	16.1	11.6	18. 5	99. 8	98.6	95. 7	96. 1	105. 5	101. 1	51, 1
Kentucky Tennessee	10. 2 14. 1	10. 5 16. 0		10, 0 14, 0		7.0 12.5	12, 5 13, 5	92 103	84 100	86 90	86 100	102 110	90 100	50 65
South Central	11.4	12, 3	11,0	11.6	12.0	9.8	13, 0	96. 1	90.5	87.3	93. 1	106. 2	97.4	57.7
United States	16.8	16. 2	16.8	15.0	13.9	12, 2	. 17. 7	88. 6	88.1	82.9	86.7	96, 9	83.5	42,4

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

Table 116.—Buckwheat: Estimated average price per bushel received by producers, United States, 1922-23 to 1931-32

Crop year	Sept.	Oct. 15	Nov 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug.	Weight- ed aver- age
19 22-23 1923-24 1924-25 1925-26 1920-27 1927-28 1923-29 1929-30 1930-31 1931-32	Cents 85. 2 96. 6 118. 8 101. 2 90. 4 92. 3 92. 6 96. 6 97. 1 52. 4	94. 2 107. 1 87. 6 86. 5	93. 4 106. 8 86. 7 83. 6 79. 4 84. 8 95. 6 82. 8	94.7 104.6 87.9 83.5 81.0 88.7 95.9 80.0	88.5 92.7 107.0 85.7 83.6	88.6 92.5 112.2 80.9	92.6 94.7 112.4 81.7 86.0 90.2 94.1 94.9	95.0 93.6 104.1 82.5 85.1 94.8 96.4 94.8	98. 4 97. 0 113. 3 85. 0 88. 1 102. 3 96. 5 95. 7	96. 5 112. 3 90. 1 98. 8 109. 0 94. 7 100. 0	101, 4 104, 5 115, 7 89, 9 101, 0 108, 0 100, 4 98, 3	123.9 110.0 93.7 98.1 98.1 99.6 97.4	87. 5 87. 0 87. 6 90. 7

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by average monthly marketings. Mean of prices reported in 1st of month and 1st of succeeding month, September, 1922–December, 1923.

Table 117.—Sorghums <sup>1</sup> for grain, forage, and all purposes: Acreage, production, value, United States, 1919-1931

				<u> </u>		<u> </u>					
		For grain	1	I	for forag	e	For	all purp	oses	Price	70
Year	Acre- age	Yield per acre	Produc- tion	Acre- age	Yield per acre	Produc- tion	Acre- age	Equivalent yield per acre	Equivalent production on total acreace	per bushel re- ceived by pro- ducers Dec. 12	Farm value, basis Dec 1 farm price
1919 1920 1921 1922 1922 1924 1924 1925 1927 1927 1927 1929 1929 1920 1920 1920 1921	1,000 acres 3,630 4,027 3,700 3,369 4,201 3,506 3,506 3,211 4,270 4,121 3,467 3,449 4,502	Bus. 20.4 21.8 21.4.7 14.7 16.7 14.2 16.8 17.0 17.5 10.8 15.5	1,000 bus. 73,950 87,732 70,947 49,523 61,649 58,454 55,236 70,869 72,736 73,425 49,390 37,203 69,558	1,000 acres 2,665 2,513 2,127 2,127 2,184 2,185 2,229 2,452 2,406 3,137 2,650	Short tons 1,67 1,767 1,37 1,40 1,40 1,29 1,32 1,47 1,48 1,33	1,000 short tons 4,438 4,479 3,791 2,917 3,050 3,050 3,050 3,613 3,586 3,654 3,750 3,533	1,000 acres 6, 295 6, 540 6, 124 5, 496 6, 354 5, 690 6, 722 6, 440 0, 722 6, 527 6, 5	18.3 13.7 13.9 15.5 13.1 15.8 16.0 17.1 13.2 9.8	1,000 bus. 122,350 136,385 112,288 75,530 88,466 87,920 82,244 101,502 107,276 111,702 81,041 64,416 104,529	Cents 127. 4 93. 8 39. 2 87. 5 93. 5 75. 1 54. 7 61. 5 63. 6 80. 0	1,000 dollars 155, 889 127, 976 44, 068 65, 942 82, 674 75, 140 61, 749 55, 007 67, 261 68, 751 57, 127 40, 949 31, 370

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See ntroductory text.

Table 118.—Sorghums: 1 Acreage and production, by States, average 1924-1928, annual 1928-1931

١		Acreage	for all p	urposes		F	roductio	n for all	1 2	
State	Aver- age, 1024- 1928	1928	1929	1930	1931 3	Aver- nge, 1924- 1928	1928	1929	1930	1931 8
Missouri. Nebraska. Kansas. Oklahoma. Tevas. Colorado. New Mevico. Arizona. California.	1,000 acres 77 24 1,327 1,463 2,855 231 240 25 85	1,000 acres 76 24 1, 153 1, 417 8, 272 220 255 25 85	1,000 acres 61 15 959 1, 198 3, 331 173 293 21 78	1,000 acres 65 12 988 1, 335 3, 593 190 297 30 86	1.000 acres 76 15 1, 107 1, 443 3, 871 191 356 24 69	1,000 bushels 1,114 378 20,775 17,861 48,311 2,235 4,463 594 2,368	1,000 bushels 1,216 420 20,754 17,004 62,168 2,530 4,590 725 2,295	1,000 bushels 915 225 14,385 13,178 43,303 1,838 4,571 567 2,059	1,000 bushi 's 975 204 10, 374 8, 678 35, 930 2, 340 2, 435 900 2, 580	1,000 bushels 1,444 218 17,712 12,987 60,000 2,101 7,832 649 1,587
United States	6, 330	6, 527	6, 131	6, 586	7, 152	98, 129	111, 702	81, 011	64, 416	104, 529

Bure 10 of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory report.

Table 119.—Sorghums: \(^1\) Yield per acre, average 1919-1928 and annual 1926-1931, and estimated price per bushel December 1, average 1925-1929, and annual 1926-1931, by States

		Equ	uvalen	i 3 leld	per ac	тө		Fst	mate	d pri	ce per	bush	el De	c. 1
State	Av., 1919– 1928	1926	1927	1928	1029	1930	1931	Av., 1925- 1920	1926	1927	1928	1929	1930	1931
Missouri Nebraska Kansus Oklahoma Tevas Colorado New Mexico Arizona California	Bush. 15.6 16.4 16.0 13.1 18.0 12.2 19.7 24.1 27.5	Bush. 14.0 10.0 12.5 12.5 19.0 5.0 21.0 22.0 27.0	Bush. 16.0 20.5 17.5 12.5 17.0 11.0 14.0 22.0	Bush, 16. 0 17. 5 18. 0 12. 0 19. 0 11. 5 18. 0 29. 0 27. 0	Bush. 15.0 15.0 15.0 11.0 13.0 10.5 15.6 27.0 26.4	Bush. 15. 0 17. 0 10. 5 6. 5 10. 0 13. 0 8. 2 30. 0	Bush. 19. 0 14. 5 16. 0 9. 0 15. 5 11. 0 22. 0 27. 0 23. 0	75. 87. 84. 64. 59. 65. 67. 62. 75. 96.	Cts. 80 80 60 45 55 60 40 60 84	Cts. 73 80 60 50 65 65 80 75 97	Cfs. 80 85 61 62 60 60 80 90	Cls. 100 100 70 65 70 80 65 95 100	Cts. 80 80 65 60 65 50 45 70	Cts. 70 65 30 30 29 23 24 45
United States	16.4	15.8	16. 0	17. 1	13. 2	9.8	14. 6	64.8	54. 2	62.7	61. 5	70, 5	63. 6	30.0

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

<sup>&</sup>lt;sup>1</sup> Kafirs, milo, feterita, durra, etc. <sup>2</sup> From 1919 to 1924, Nov. 15 price. <sup>3</sup> Preliminary.

<sup>1</sup> Kafirs, milo, feterita, durra, etc. 2 Includes grain equivalent on forage acreage. 4 Preliminary.

<sup>&</sup>lt;sup>1</sup> Kafirs, milo, feterita, durra, etc.

Table 120.—Grain sorghums: 1 Receipts at Kansas City, by months, 1922-23 to 1931-32

Crop year	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Total
1922-23 1932-24 1924-25 1925-26 1925-26 1926-27 1927-28 1928-29 1929-30 1930-31	1,000 bush. 168 195 647 279 397 410 449 294 299 257	1,000 bush. 444 350 1,152 629 493 905 675 626 239 76		1,000 bush. 233 579 636 290 442 519 525 447 145	1,000 bush. 169 398 497 261 293 592 705 327 130	1,000 bush. 139 340 320 211 216 392 426 296 139	1,000 bush. 76 274 301 290 192 323 394 202 109	1,600 bush. 50 262 440 469 211 343 668 179 204	1,000 bush. 69 250 221 162 249 224 207 68 41	1,000 bush. 35 106 193 94 285 87 196 42 38	1,000 bush. 19 63 68 136 79 51 97 52 31	1,000 bush. 18 103 24 97 112 236 182 34 134	1,000 bush. 1,840 3,385 5,172 3,334 3,625 4,778 5,390 2,863 1,671

Bureau of Agricultural Economics. Compiled from annual statistical reports of Kansas City Board of Trade.

Table 121.—Grain sorghums: Classification of receipts graded by licensed inspectors, all inspection points, total of all classes under each grade, 1925–26 to 1930–31

			Gra	de		
	No. 1	No. 2	No. 3	No. 4	Sample	Total
Year beginning July— 1925-26 1926-27 1927-28 1928-29 1929-30 1930-81	Cars 312 878 1, 175 866 557 224	Cars 4, 158 7, 150 9, 885 7, 247 5, 495 2, 368	Cars 5, 796 6, 674 8, 125 5, 400 4, 043 2, 432	Cars 1, 639 1, 792 3, 143 6, 794 3, 661 1, 240	Cars 495 691 965 3, 969 1, 722 390	Cars 12, 400 17, 215 23, 293 21, 276 15, 481 6, 654

Bureau of Agricultural Economics.

Table 122.—Kafir, No. 2 White: Weighted average price 1 per bushel of reported cash sales, Kansas City, 1921-22 to 1931-32

Crop year	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Aver- age
1921-22 1922-23 1922-24 1924-25 1926-26 1926-27 1927-28 1929-29 1929-30 1930-81 1931-82	Cents 48 100 (2) 88 82 64 69 78 77 63 40	Cents 50 91 71 98 77 64 71 73 61 33	Cents 50 89 (2) 109 77 63 74 75 76 58	Cents 72 90 68 103 72 63 81 80 72 53	Cents 74 93 67 93 68 65 88 71 77 53	Cents 67 96 73 92 70 69 90 71 91 50	Cents   72   99   62   97   69   79   92   71   91   58	Cents 77 94 85 105 70 102 91 74 94 57	Cents 93 84 94 113 79 110 92 89 92 51	Cents 96 83 (*) 116 76 97 83 90 101 42	Cents 111 (2) 113 107 74 (2) 89 105 98 42	Cents 102 (2) 89 100 71 70 83 51 (3) 36	Cenis 76 76 101 78 82 77 55

Bureau of Agricultural Economics. Compiled from Kansas City Grain Market Review, formerly Daily Price Current. Quoted per 100 pounds; converted to bushels of 56 pounds. Data for 1909–1920 available in 1980 Yearbook, Table 123.

<sup>&</sup>lt;sup>1</sup> Includes kafir corn, milo maize, and feterita. Quoted as Kafir in Table 117, 1927 Yearbook. Receipts for 1909–10 to 1921–22 available in 1931 Yearbook, p. 670, Table 131.

<sup>1</sup> Average of daily prices weighted by car-lot sales.

No quotations.

## STATISTICS OF COTTON, SUGAR, AND TOBACCO

Table 123.—Cotton: Acreage, production, value, exports, etc., United States, 1849, 1859, 1866-1931

Year	Acreage har- vested	Average yield per acre	Produc- tion 1	Price per pound received by pro- ducers, Dec. 1	Farm value, ba- sis Dec. 1 farm price	Average price per pound, New York <sup>9</sup>	Domes- tic ex- ports, year be- ginning Aug. ***	Imports, year begin- ning Aug. 46	Net ex- ports, year be- ginning Aug. 8 4 8 7
1849	1,000 acres	Lbs.	1,000 bales 2,469 5,387	Cents	1,000 dollars	Cents 12, 34	1,000 bales 8 1,271	1,000 bales 8 1	1,000 bales 8 1, 270
1859			5.887			11.00	8 3, 535	894	8 3, 531
1866 1867	7, 599	129.0	1,750			31.59	8 1, 323	82	8 1, 324
1867	7,828	189.8	2,340 2,380	1		24.85	1,511	2	1, 510
1868	6, 799	192.2	2,380			29.01	1,288	98	1, 281
1869	0,.50	1022	3.012			23.98	_,~~		-,
1869 1870	7,743	196.9	3,012			23.98	1,980	4	1, 977
1870	8, 885	198.9	3,800			16.95	2,894	3	2,002
1071	7, 558	148.2	2,553			20.48	4,00%	7	2, 893 1, 844
1871	7,008	198.2	3,920				1,851		1, 844
1872	8, 483	188. 7	3,920			18.15	2,437 2,706	11	2, 426
1873 1874	9, 510	179.7	3,683			17.00	2,706	5	2, 702
1874	11, 764	147.5	3, 941			15.00	2,523	5	2, 520
1875	11, 934	190.6	5, 123 4, 438			13.00	2, 523 3, 003	5	2, 999
UK/K	11 877	167.8	4,438	9.0	174, 724	11.73	2,869 3,198	6	2,864
1877	12, 133	163.8	4,370 5,244	1		11.28 10.83	3, 198	7	3, 194
1878	12, 344	191.2	5, 244	8, 2	192, 515	10.83	3, 265	6	3, 259
1877 1878 1879	14.480	181.0	5,755	10.3	260, 305	12,02	3,711	7	3, 705
13041	15 951	184.5	6, 343	9.8	289, 083	11.34	4, 409	5 6 7 6 7 9	4, 403
1881 1882	16, 711	149.8	5, 456			12.16	3, 430	Ď	3, 426
1882	16, 277	185.7	6, 957	9,1	275, 513	10.63	4, 582	l š	4, 577
1883	16, 778	164.8	5, 701	9.1	250 977	10.64	8,745	15	8, 734
1884	17, 440	153.8	5, 682	9. 2	250, 977 246, 575	10.54	3,740	10	3, 733
1885	18, 301	164.4	6, 575	8.4	250, 070	9.44	4, 198	ii	4, 185
1886	18, 455	169. 5	6, 446	0.7	251, 775 251, 856	10. 25	4, 274	1 1	4, 266
1887	18, 641	182.7	7, 020	5.7	201,000	10. 27	3,2/3	11	
1888	19, 059	180. 4	6,941	8.1 8.5 8.5	290, 901 292, 139 275, 249 313, 360	10. 21	4,557 4,720 4,934 5,859		4, 547 4, 704
1000	20, 175	180. 4	0,941	8.0	292, 139	10.71	4,720	17	
1889	20, 175	159.7	7, 473	8.5 8.6	275, 249	11.27	4,934	19	4, 915
1890 1891	19, 512	187.0	8,674	8.6	313, 360	9.48	5,859	45	5, 815
1891	19,059	179.4	9,018	7.2	247, 633	7.68	5.888	61	5, 827
1892 1893	15, 911	209. 2	6,664	8.3	277, 194	8.45	4,456	90	4, 367
1893	19, 525	149.9	7,493	7.0	204, 983	7.75	5,309	58	5, 253
1894	23, 688	195.3	9,476	4.6	212, 335	6.38	5,309 7,010	104	5, 253 6, 908
1895	20, 185	155. 6	7, 161	7.6	238, 503 286, 169	8.10	4.710	115	4, 598
1896	23, 273	184.9	8, 533 10, 898	6.7	286, 169	7.71	6.172	119	6, 055
1897	24, 320	182.7	10,898	6.7	296, 816	6.40	7, 757	102	7, 656
1898	24, 967	220.6	11, 189	5.7	315, 449	6.00	7,662	105	7, 557
1899	21.275		9.345	1		1	1 .,00-	1	1,00
1899	24 327	183.8	9.345	7.0	326, 215	8.36	6.229	140	6, 091
1900 1901	24 033	194.4	9,345 10,123	9.2	463, 310	9.38	6, 228 6, 800	109	6, 692
1901	26.774	170.0	9,510	7.0	334, 088	8.73	6,949	202	6,750
1902	26, 774 27, 175	187.3	10,631	7.6	403, 718	9.96	7,084	151	0,700
1902 1903	27, 052	174.3	9,851	10.5	£10, (18	12.84	6, 207	101	6, 936
1004	31, 215	205. 9	18 160	10.0	516, 763	14.64	0,207	103	6, 107
1904 1905	27, 110	200.9	13, 438 10, 575	9.0	603, 438	9.09	8,908	129	8, 781
1900	27, 110	186.6	10,073	10.8	569, 791 635, 534	11.30	7,118	144	6, 980
1906 1907	31, 374	202.5	13, 274	9.6	635, 534	11.24	8,943	227	8, 741
1907	29,660	179.1	11, 107	10.4	575, 226	11.53	7,666	153	7, 518
1908	32, 444	194.9	18,212	8.7	575, 092	10.23	8,955	181	8,778
1909	\$2,044	l	10,005	I		·!	l		

Bureau of Agricultural Economics; italic figures are census returns; other acreage, yield, and production figures are estimates by the crop-reporting board; acreage revised on census basis.

figures are estimates by the crop-reporting board; acreage revised on census basis.

1 500-pound gross weight bales, from 1899-1931.
2 Compiled, 1849-1838, from Cotton Movement and Fluctuations, an annual, published by Latham, Alexander & Co., New York, and are averages for crop year beginning September. From New York Commercial and Financial Chronicle, 1859-1899, and from reports of New York Cotton Exchange since 1990. Since 1839 the averages are for crop year beginning August.

2 Excluding linters from 1914 to 1920.
4 Compiled from Commerce and Navigation of the United States, 1849-1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June and July, 1919-1931, and January, 1927-1931.

3 Bales of 500 pounds gross weight.

3 Bales of 500 pounds gross weight.

4 Total exports (domestic plus foreign) minus imports.

3 Year beginning July 1.

5 Estimated from value of imports. Average import price per pound calculated by assuming that the percentage change in import price from the previous year is equal to the percentage change in the export prices.

Table 123.—Cotton: Acreage, production, value, exports, etc., United States, 1849, 1859, 1866-1931—Continued

Year	Acreage har- vested	Average yield per acre	Produc- tion	Price per pound received by pro- ducers, Dec. 1	Farm value, ba- sis Dec. 1 farm price	Average price per pound, New York	Domes- tic ex- ports, year be- ginning Aug	Imports, year begin- ning Aug.	Net exports, year beginning Aug.
1909	36, 045 34, 283 37, 089 36, 832 34, 985 33, 841 34, 985 33, 546 33, 546 33, 559 34, 123 35, 569 37, 123 39, 204 46, 053 40, 138 45, 343 45, 343	Lbs. 154. 3 170. 7 207. 7 190. 9 182. 0 209. 2 170. 3 156. 6 159. 7 159. 6 161. 5 178. 4 124. 5 141. 2 130. 6 157. 4 167. 2 182. 6 154. 5 155. 7 155. 6	1,000 bales 10,005 11,609 15,693 13,703 14,156 16,185 11,192 11,450 11,491 11,4	Cents 13. 9 14. 1 8. 8 11. 9 12. 2 6. 8 11. 3 19. 6 27. 7 27. 6 35. 6 18. 9 16. 2 23. 8 31. 0 22. 6 18. 0 18. 0 18. 0 18. 0 18. 0 18. 0	1,000 dollars 697,681 820,407 687,888 817,055 862,708 549,036 631,480 1,122,295 1,566,198 1,683,633 2,034,558 933,658 643,933 1,160,968 1,571,829 1,540,884 1,464,032 1,29,885 1,201,796 1,217,829 1,217,829	Cents 14.66 14.87 10.85 12.29 13.21 19.8.89 11.98 29.68 31.01 38.29 17.89 18.92 26.24 31.11 24.74 20.51 16.60	1,000 bales 6,353 8,027 11,118 9,146 9,508 8,702 6,113 5,525 4,402 5,777 6,348 8,240 8,240 8,240 7,353 8,419 7,035 7,133	1,000 bales 170 245 233 249 273 400 458 311 231 211	7,757 10,857 8,899 9,251 8,322 5,673 5,219 4,175 5,568 5,753 5,930 4,536 5,530

Average for nine months only. Exchange closed August-Nov. 17, on account of war.
 Cotton grown in the United States. Excludes about 7,000 bales Lower California cotton ginned in the United States. Small quantities such cotton included in census ginning reports and prior years.
 Preliminary.

Table 124.—Cotton: Acreage in cultivation and acreage abandoned, by States, averages, and annual, 1926-1931

		Acreag	e in cu	ltıvati	on July	7 1		A	creage	aban	done	i after	July	1
State	Aver- age, 1925- 1929	1926 ¹	19271	1928	1929	1930	1931 *	A⊽., 1920– 1929	19268	1927	1928	1929	1930	1931
Aissouri Pirgma North Carolina Ooth Carolina Feorgia Plorida Pennessee Liabama Aississippi Lrkansas Oousiana kiahoma Penas New Mexico Luzona Lutonia Lill other United States	124 180 202 34	95, 2, 716 4, 025 1, 178 3, 699 3, 867 2, 018 5, 083 19, 140 168 167 44	65 1, 749 2, 454 3, 501 67 985 8, 214 3, 408 3, 142 1, 585 4, 187 16, 850	81 1, 892 2, 485 3, 883 1, 145 3, 643 4, 154 3, 834 4, 420 18, 330 123 202 223 23	89 1, 916 2, 273 8, 818 96 1, 147 3, 727 4, 229 3, 933 2, 132 4, 430 18, 229 19 19	207es 3777 1,656 2,191 3,906 1,250 1,250 3,4290 3,996 2,142 2,739 17,528 10,215 273 10	118 1, 109 3, 444 4, 036 3, 598 1, 934 3, 352 15, 656 116 178 197	4.8 2.0 2.7 3.6 5.2 2.3 2.8 6.7 3.8 4.10.6 1.6 4.4	8.00 1.55 1.50 3.03 1.50 2.00 4.06 3.03 4.06 3.03	4.5 20 1.2 4.0	2.77 5.00 5.00 3.00 3.00 4.00 5.00 2.00 2.00 2.00 2.00 2.00 2.00 2	2.0 2.5 1.0 2.5 1.0 1.5 1.0 2.5 1.0 1.5 1.0 1.5 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	2008 1100 1200 125 125 125 125 125 125 125 125 125 125	1.0 0.7 0.9 3.0 0.4 0.7 1.0 0.7 1.0

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>&</sup>lt;sup>1</sup> In cultivation June 25. <sup>2</sup> Preliminary. <sup>3</sup> Abandoned after June 25. <sup>4</sup>8-year average.

Table 125.—Cotton: Acreage harvested, by States, 1919-1931

State	1919	1920	1921	1922	1923	1921	1925	1926	1927	1928	1929	1930	1931 1
Missouri Virginia North Carolina South Cerolina Geor, a Florida Tennessee Alabama Mississippi Arkansas Louisiana Oklahoma Texas New Mexico Arizona California All other	acres 125 42 1,490 2,835 5,220 103 758 2,791 2,848 2,725 1,527 2,124	42 1, 557 2, 961 4, 900 840, 2, 855 2, 950 2, 980 1, 470 2, 749 11, 898	4, 172 65 634 2, 235 2, 628 2, 382 1, 168 2, 206 10, 745	55 1, 625 1, 912 3, 415 118 985 2, 771 3, 014 2, 799 1, 140 2, 915 11, 874 28 101 67	acres 355 74 1, 679 1, 965 3, 421 1, 172 3, 079 8, 170 3, 197 14, 150 60 127	493 102 2,005 2,404 3,046 8,055 2,981 3,094 1,616 3,861 17,175 101 180	2, C51 3, 589 101 1, 173 3, 504 3, 466 3, 738 1, 874 5, 214 17, 608 107	105 1, 143 3, 651 3, 752 3, 790 1, 979 4, 676 18, 374 120 167	04 1, 728 2, 356 3, 413 965 3, 166 3, 340 3, 048 1, 542 3, 601 16, 176 139 128	2, 361 3, 728 95 1, 107 3, 534 4, 029 3, 681 1, 990 4, 243 17, 743 117, 200 218	1, 878 2, 216 3, 753 94 1, 136 3, 690 4, 166 3, 858 2, 114 4, 275 17, 500 226 309	89 1, 643 2, 173 3, 863 1, 225 3, 770 4, 243 3, 908 2, 110 3, 997 16, 950 2, 127 215	71 1, 345 1, 910 3, 440 114 1, 105 3, 988 3, 562 1, 920 3, 318 15, 421 114 176 195
United States_ Lower California (old Mexico)	33, 566 100				37, 123 150	'				1			

Bureau of Agricultural Economics. Istimates of the crop-reporting board.

Table 126.—Cotton: Production of lint in 500-pound gross-weight bales, by States, and linters, United States, 1919-1931

State	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	19311
Missouri Virginia North Carolina South Carolina Georgia Florida Tennessee Alabama Alississippi Arkansas Louislana Oklahoma Tevas New Mexico Arizona California All other	1,000 bales 64 23, 830 1,426 1,660 713 961 298 1,016 3,099	1, 336 4, 345 10 103	2, 195 6 45 34	391 824 989 31, 011 343 627 3, 222 12 47	511, 020 770 588 12 2266 587 604 2622 363 6, 350 24, 340 78	807 21,002 222 285 1,099 21,094 493 1,511 24,949 257 10s	1, 102 889 1, 164 38 2,515 1, 357 1, 991 21, 600 1, 691 24, 163 266 119 122	1, 008 1, 496 32 2 451 1, 498 1, 888 1, 548 820 1, 773 2 5, 628 2 76 2 122	31 861 730 1,100 1,100 21,191 1,355 1,037 24,359 24,359 291	44 836 726 1, 030 1, 030 1, 475 1, 216 1, 203 25, 100 288 2149 172	747 830 1, 343 29 2 515 1, 342 1, 915 1, 435 23, 940 1, 143 23, 940 153 260	42 775 1, 001 1, 593 50 2 377 1, 473 1, 464 874 715 854 24, 039 155 264	43 775 1, 015 1, 305 43 60b 1, 430 1, 725 1, 855 1, 220 5, 270 (88
United States	11, 421	13, 440	7, 954	9, 755	10, 110	13, 628	16, 104	17, 977	12, 955	14, 478	14, 828	13, 932	16, 918
Linters, total U. S.3	608	440	398	608	669	897	1, 115	1, 158	1,016	1, 282	1, 241	986	

Bureau of Agricultural Economics. Compiled from reports of the Bureau of the Census.

<sup>1</sup> Preliminary.

<sup>&</sup>lt;sup>1</sup> Preliminary estimate of the Department of Agriculture.

<sup>2</sup> Slight differences from census figures on ginnings are due to ginnings in one State of cotton grown in another.

<sup>3</sup> Year beginning Aug. 1.

Table 127.—Cotton: Yield per acre and estimated price per pound, December 1, by States, averages, and annual, 1926-1931

			Yıel	d per s	cre		i		Estin	nated	price	per p	ound	
State	Av., 1920– 1929	1926	1927	1928	1929	1930	1931	Av., 1925– 1929	1926	1927	1928	1929	1930 '	1331
Missouri Virginia North Carolina South Carolina Georgia Florida Tennessee Alabama Mississippi Arkansas Louislana Oklahoma Teras New Mexico Arizona California	Lbs. 254 246 247 160 136 113 184 151 182 169 100 140 140 1293	264 292 182 150 145 188 196 241 195 200 181 147 299	Lbs. 188; 230; 238; 148; 154; 126; 176; 180; 194; 157; 170; 138; 129; 352; 315; 340	150 175 162 166 136 138 360 357	145 217 174 220 178 183 128 108 333 324	147 187 165 107 162 102 114 375 346	194 180 262 200 207 249 216 176 412 324	17. 1 17. 0 16. 7 16. 5 15. 9 16. 6 17. 5 16. 4 16. 6 15. 9 16. 4 17. 9	10. 0 11. 4 11. 5 11. 7 11. 1 10. 2 10. 0 10. 7 11. 6 11. 0 9. 7 10. 8 12. 3 13. 3	20. 0 19. 5 19. 6 19. 4 19. 1 19. 0 20. 5 20. 2 19. 8 19. 8 19. 8	13. 0 18. 2 18. 5 18. 4 18. 2 17. 9 18. 5 18. 5 18. 5 17. 2 17. 5 19. 5	17. 0 16. 7 16. 4 15. 8 16. 7 16. 3 16. 1 17. 2 16. 7 16. 6 17. 7 22. 5	9.5 9.6 9.9 9.3 8.8 9.1 9.0 10.2 9.3 8.8 9.4 10.2	5.5 5.4 6.0 5.1 5.8 7.9
United States	154. 4	182. 6	154. 5	152. 9	155. 0	147. 7	200. 1	16.6	10. 9	19.6	18.0	16. 4	9, 5	5. 7

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

Table 128.—Cotton: World production of lint, 1909-10 to 1931-32

		Estimat- ed world		Produ	ction in se	elected cor	ıntries		Estimat- ed world
Crop year	total ex- cluding China		United States	India	Egypt	China 1	Brazil	Russia	total commer- cial crop 1
1909-10- 1910-11. 1911-12. 1912-13. 1913-14. 1914-15. 1916-17. 1917-18. 1918-19. 1919-20. 1920-21. 1921-22. 1922-23. 1923-24. 1924-25. 1926-27. 1928-29. 1928-29. 1928-29. 1928-30. 1928-30. 1930-31.	18, 400 21, 900 21, 100 22, 200 24, 200 17, 800 18, 366 17, 618 18, 782 19, 217 13, 886 17, 707 22, 625 24, 434 24, 250	1,000 bales 3		1,000 bates 3 3,998 2,730 3,759 4,239 4,239 4,239 3,759 3,393 3,303 3,753 4,853 3,753 4,200 4,20	1,000 bales 3 1,036 1,536 1,555 1,555 1,558 1,588 1,387 989 1,155 999 1,155 999 1,155 999 1,155 1,251 1,251 1,251 1,588 1,261 1,672 1,715 1,288	1,000 bates 3	1,000 bales 2 324 357 360 418 477 465 339 337 414 406 467 503 576 602 512 487 525 525 584 455	1,000 bales 1 	1,000 bates 4 \$ 18,027 \$ 21,269 \$ 22,618 \$ 22,68 \$ 17,69 \$ 18,755 \$ 19,65 \$ 16,334 17,925 \$ 17,675 \$ 20,230 \$ 18,755 \$ 20,230 \$ 21,618 \$ 22,830 \$ 25,648 \$ 26,648 \$ 2

Bureau of Agricultural Economics. Compiled from official sources and International Institute of Agriculture unless otherwise stated. The crop year is from Aug. 1 to July 31. For the United States prior to 1914 the figures apply to the year beginning Sept. 1.

Bales of 478 pounds net.
 American in running bales and foreign cotton in bales of 478 pounds net.
 Bales of 500 pounds net.

<sup>18-</sup>year average.

<sup>&</sup>lt;sup>1</sup> Chinese Cotton Mill Owners' Association, except for 1930-31 and 1931-32, which are estimates of this bureau. Figures represent the crop in the most important cotton-producing Provinces where the commercial crop is grown. Most of the cotton produced in other Provinces is used for home hand-loom consumption. <sup>2</sup> Figures as reported by the U.S. Bureau of the Census, including the cotton destined to enter commercial channels for factory purposes. Estimates of the commercial crop in China are included.

<sup>3</sup> Relea of 478 rounds and

Second forecast of production which includes total crop except late plantings.

Table 129.—Cotton: Acreage and yield of lint per acre in specified countries; average, 1909–10 to 1913–14, 1924–25 to 1928–29; annual, 1928–29 to 1931–32

			۱cr	eage				Yield	l of li	at per	acre	
Country		ыре, 1924- 25 to	1928 29	1929– 30	1930- 31	1931- 321	Av- er- age, 1909- 10 to 1913- 14	Av- er- age, 1924- 25 to 1928- 29	29	1929– 30	1930- 31	1931– 321
United States India Egypt China Brazil Russia Mevico Chosen (Korea) Uganda Peru Anglo Egyptian Sudan Argentina	acres	26, 369 1, 817 4, 360 1, 290 1, 695 443 487 594	acres 45, 341 27, 033 1, 505 4, 847 1, 273 2, 258 502 503 699 283 315	25, 922 1, 911 5, 133 1, 436 2, 550 492 456 663 314 369	acres 45, 091 23, 610 2, 162 5, 228 1, 614 3, 870 473 740	223, 511 1, 747 5, 078 5, 281 326 461 876	76 399 276 353 67 169	202 243 262 132 115 360 210	261 265 142 117 379 216	79 443 197 195 246 239 146 71 461 180	148 82 379 206 135 191 217 156 101	68 352 169 172 309 141 109
Total above countries, in- cluding China, reporting 1928-29 to 1936-31.  Estimated world total, in- cluding China.				1	83, 995 86, 700	81, 000						

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. Data for crop year as given at the head of the table are for crops harvested between Aug. 1 and July 31. This applies to both Northern and Southern Hemispheres. For the United States prior to 1914 the figures apply to the harvest year beginning Sept. 1.

Table 130.—Cotton: Estimated monthly marketings by farmers, 1921-22 to 1930-31

Стор уеаг	1				Per	centag	e of ye	ar's sa	les 1				
Стор усаг	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Sea- son
1921-22 1922-23 1923-24 1924-25 1925-26 1926-27 1927-28 1928-29 1929-30 1930-31	3.6 5.2 4.1 3.3 6.5 2.7 6.6 4.6 7.7	14. 0 16. 8 16. 3 15. 2 19. 3 15. 2 20. 0 15. 6 18. 2 19. 0	22. 3 25. 3 24. 6 25. 2 23. 1 22 0 23. 8 24. 8 28. 3 25. 6	17. 1 19. 8 24. 9 22. 3 17. 6 19. 5 17. 3 20. 8 20. 6 20. 3	12 1 12 8 13.3 14.5 12.0 12.5 9.7 12.8 11.8 11.7	5.9 5.8 7.0 6.3 4.2 5.4 4.2 3.9	4.3 4.4 3.1 5.3 4.2 5.8 4.0 4.0 2.6 2.8	4.67 2.44 3.41 5.00 4.28 2.4	4.6 2.0 1.7 1.6 2.3 3.8 3.1 1.8 1.4 1.8	5.9 1.0 1.3 1.0 1.7 3.1 2.7 1.6 1.1	3.0 1.5 2.6 2.1 2.5 2.3 1.6 1.8	2 6 1.6 1.6 1.6 1.6 1.9 2.1	100. 0 100. 0 100. 0 100. 0 100. 0 100. 0 100. 0 100. 0

Bureau of Agricultural Economics.

<sup>1</sup> Preliminary.

Frourth forecast, which includes total area except late plantings.
Average for 3 years.
Average, 1914–15 to 1918–19.

<sup>&</sup>lt;sup>1</sup> As reported by about 7,500 cotton growers, supplemented by records of State weighers, cooperative associations, and cotton dealers.

Table 131.—Cotton: Production of lint in specified countries: average, 1909-10 to 1913-14, 1924-25 to 1928-29: annual, 1927-28 to 1931-32

			Yeur b	eginnıng A	ugust		
Country	Average, 1909-10 to 1913-14	\verage, 1921-25 to 1928-29	1927-28	1923–29	1929-30	1930-31	1931-32 1
NORTH AMERICA							
United States !	Bales 2	Bales 2	Bales 1	Bales 2	Bales 2	Bales 1	Bales 2
Mexico	186, 821	242, 865	179, 238	278, 460	246, 029	13, 932, 000 177, 508	207, 000
Total North American countries reporting 1927– 28 to 1930–31			13, 134, 238	14, 756, 460			
SOUTH AND CENTRAL AMERICAS, WEST INDIES	!						
Venezuela		32, 876					
Colombia	108 000	14 708	11, 207 245, 615		10,000	10,000	
Ecuador	108,000	226, 428 6, 719 546, 265 7 11, 198	4, 556	224, 528 5,097	302, 514 6, 788	12 010	
Brazil		546, 265	4, 556 487, 041	5, 097 525, 231	554, 477	454, 999	<sup>8</sup> 550, 000
Paraguay	2,314	7 11, 198	101 405	12,604	16, 596	18, 449	
Guetemala	875	99, 763 700	101, 467		145, 599		
Haiti 4	9,300	20, 922	20, 419	21, 920	23, 635		
Dominican Republic	0 1, 163 10 1, 319	1 422	273 960	76			
Selvedor	4, 1, 918	2, 739	189				t
Brazil Paraguny Argentina Guatemala Hati   Dominican Republic Porto Rico Salvador British West Indies	6,058	1, 478 2, 739 4, 150	4, 245			5,000	
Total South and Central American countries and West Indies reporting 1927–28 to 1930–31			507, 049	     543, 832	605, 765	482, 045	
EUROPE							
Italy Yugoslavia Greece	5, 212	8 4, 760			3, 300		
Y Ugosiavia	11 12 19 614	352 14,807	190 12,57	218 14,875	585 15, 264		
Bugaria	. 842	2,409	3, 45	7 3, 214	4,180	4,47	5,000
Malta		460	283	7 453	317	24	5
Spain		2, 270	2, 55	3, 189	3, 000	7, 43	
Total European countries reporting 1927–28 to 1930–31			19,058	21, 949	23, 346	23, 175	 
AFRICA							
Algeria Morocco (French) French West Africa: Dahomey	9 1, 370	5, 120		1 6, 288 9 351			1,000
Dahomey	4 664	4, 397	3, 44	3, 330	5, 705	5, 84	3
Dahomey	4 8 213	6,441	7, 12	7 8,309	8,032	9, 43	3
French Guines	4 10 16	1,821	2,30 2,30 9,40	6 1,845 8 4 249	FAR	58	
French Sudan		7, 539	9, 40	9, 501	9, 501	12, 63	
Upper Volta		6, 79	3, 50	3, 816	5, 876	4, 44	l
French Togo	- 8 2, 46	7, 448	7,08	4 9,432 5 04 000	8,805	15 00	
French Equatorial Africa		9 977	17, 51	20,883	3, 228	6, 91	4,600
French Guinea Senegal French Sudan Upper Volta French Togo Nigeria French Equatorial Africa Egypt	1, 453, 000	1, 535, 000	1, 261, 00	0 1, 672, 000	1, 768, 000	1,715,00	1, 286, 000

<sup>1</sup> Preliminary.
2 Bales of 478 pounds net.
3 Linters not included. Production of linters during this period has been: Average 1909-10 to 1913-14,
502,711 bales; 1924-25 to 1928-29, 1,093,710 bales; 1927-28, 1,016,375 bales; 1928-29, 1,282,061 bales; 1929-30,
1,241,355 bales; 1930-31, 983,430 bales.
4 Exports.
5 Based on an official estimate for Northern Brazil (10 States), which during the last 10 years have produced over 80 per cent of the total Brazilian crop.
6 For season 1915-16.
7 Average for 4 years.
8 Average for 2 years.
9 Average for 2 years.
10 For 1 year only.
11 For season 1911-12.
12 Old boundaries.

Table 131.—Cotton: Production of lint in specified countries; average, 1909-10 to 1913-14, 1924-25 to 1928-29; annual, 1927-28 to 1931-32—Continued

			Year b	eginning A	ugust		
Country	Average, 1909-10 to 1913-14	A verage, 1921–25 to 1925–29	1927–28	1928-29	1929-30	1930-31	1931–32
AFRICA—continued		D. J	7-1	Deles	Bales	Bales	Bules
Anglo-Egyptian Sudan	Bales 14, 455	Bales 106, 409	Bales 111, 822	Bules 142, 191	139, 200	106, 470	Dutes
Italian Somaliland	€ 510	3.694	3, 828	7. 034	7, 500	3, 459	4,000
			1,384	1, 061	1, 153	2, 000	2,000
Eritrea Gold Coast Belgian Congo Kenya Uganda Tanganyika Nyasalaud Northern Rhodesia Southern Rhodesia Mozambique Union of South Africa	103	7 404	84	196	30, 831		
Kenyo	559	22, 188 1, 465	27, 557 4 1, 039	30, 867 4 1, 660	1, 270	670	
Uganda	20, 338	142, 453	115, 836	170, 757	108, 051	155, 647	184,000
Tanganyika	477,971	19,032	13, 360	27, 578	23, 251	19, 360	
Nyasaland	4,603	4, 448	2, 336	3, 740	5, 098 41	7, 806	
Northern Rhodesia	3 304	200 1, 986	44 72	52 226	1, 130	1, 757	
Mozambique	4.355	8, 228	11, 956		7, 192	2, 10.	
Union of South Africa	76	11, 439	9, 216	8, 179	13, 496	7, 312	
Total African countries							
reporting 1927-28 to 1930-31			1, 567, 437	2, 097, 624	2, 145, 521	2,079,550	
ASIA			<del>۔۔۔۔۔۔</del>				
O	1 000	0.455	1, 766	1 704	9 048	9 000	
Turkey (Asiatica	13 102 116	2, 455 89, 532	53, 831	1, 796 113, 255	2, 946 100, 433	73, 970	
Syria and Lebanon	102, 110	9,023	9, 582	4, 312	14,000	12,000	17,000
Russia 14	901,900	831,000	1,090,000	1, 250, 000	1, 310, 000	1, 550, 000	131.900.000
Cyprus. Turkey (Asiatic) Syria and Lebanon Russia <sup>14</sup> Iraq		2,601	1,506	4, 353	3,974	2, 625	-5-626-666
Tradio	3 555 000	75, 831 4, 866, 000	75,007	91, 735 4, 838, 000	67, 638	4 033 000	3, 349, 000 3, 349, 000
China 17	0, 0, 0, 000	2,072,000	1, 875, 000	2, 466, 000	2, 116, 000	4, 033, 000 2, 250, 000	1, 500, 000
Persia 4 India China <sup>II</sup> Japanese Empire:	1	.,					-, -,,
Japan	4,701	1,502	1, 100	943	724		
Chosen (Korea)	20, 392	134, 317	133, 239 5, 067	119, 875 6, 121	138, 912 8, 120	151,000 15 5,752	136,000
Dutch East Indies	8 15, 242	5, 577 5, 171	5, 315	4, 262	4, 061	0, 172	
Japan Chosen (Korea). French Indo-China Dutch East Indies 4 Siam	4 3, 653	3,470	2, 885	2, 756	3, 200		
				<u> </u>		1	
Total Asiatic countries reporting 1927-28 to						1	
1930-31			8, 159, 990	8, 833, 715	7, 983, 415	8,085,376	
OCEVNI							
Arctrolio	<del>,,</del> 0	7,030	7, 714	5, 036	8, 394	Q KAA	
Australia New Hebrides	7 517	2, 485	2, 582				
						,	
Total Octania reporting 1927-28 to 1930-31		W 000	pg pag 4	- 000	0.004	0 000	
1927-28 to 1930-31		7, 030	7,714	5, 036	8,391	9, 500	
Total all countries re- porting 1927–2s to 1930– 31			22 205 486	26 259 616	25 540 470	24, 789, 152	
V*			, 000, 100	=0, 200, 010	20,070, 170	, 100, 102	
Estimated world total, including China	20, 900, 000	26, 400, 000	24, 000, 000	26, 900, 000	26, 500, 000	25, 600, 000	27, 300, 000

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture except as otherwise stated. Data for crop year as given at the head of the table are for crops harvested between Aug. 1 and July 31. For the United States prior to 1914 the figures apply to the year beginning Sept. 1.

<sup>4</sup> Exports.
7 Average for 4 years.
8 Average for 2 years.
8 Average for 3 years.
18 For season 1910-11.
11 It is estimated that in 1930-31,8.4 per cent and in 1931-32, 16.6 per cent of the total acreage was in European Russia.

<sup>15</sup> Estimates of Bureau of Agricultural Economics.

is Estimates of Bureau of Agricultural Economics.
is From an unofficial source.
is Estimates of the Chinese Mill Owners' Association, except figures for 1930-31 and 1931-32, which are estimates of this bureau. The figures represent the crop in the most important Provinces where the commercial crop is grown.
is Includes Annam and Tonkin.

Table 132.—Cotton: Supply and distribution, United States, 1913-14 to 1930-31

		8	upply				I	Distribu	tion		
Year beginning August	Produc- tion	from pr		Im-	Total	Consu	nption	Ex-	Stock hand a of y		Total dis-
	CIOH	For- eign	Total	ports	supply	For- eign	Total	ports	For- eign	Total	tribu- tion <sup>1</sup>
1913-14 1914-15 1918-16 1918-17 1917-18 1918-19 1919-20 1920-21 1921-22 1922-23 1922-24 1922-24 1924-25 1925-26 1925-27 1927-28 1928-27 1927-28	11, 068 11, 364 11, 248 11, 906 11, 326 13, 271 7, 978 9, 729 10, 171 13, 639 16, 123 17, 755	1,000 bales 83 73 145 212 143 111 83 284 167 196 116 106 129 99 111 182 209	1,000 bales 1,511 1,366 3,140 2,720 3,450 4,287 3,563 6,534 4,287 2,325 1,566 1,610 3,543 3,762 2,312 4,530	1,000 bales 261 382 438 292 221 202 700 226 363 470 292 313 326 401 338 458 378 108	1,000 bales 15,755 17,654 14,189 14,189 16,558 16,313 17,060 14,875 13,031 12,788 16,508 18,059 16,883 17,291 17,238 18,394	1,000 bales 194 222 317 318 184 17 216 227 328 276 280 309 299 313 302 179	1,000 bales 5,577 5,597 6,598 6,789 6,566 5,766 6,420 4,893 5,910 6,666 5,681 6,193 6,193 6,193 6,193 6,193 6,193 6,594 6,568 7,190 6,884 7,091 6,106 5,263	1,600 bales 8,655 8,323 5,303 4,288 5,545 6,545 6,545 6,545 6,184 8,005 110,927 6,540 6,900 6,760	1,000 bales 73 145 212 143 111 83 284 174 196 116 106 129 99 111 182 209 107	1,000 bales 1,366 3,936 3,936 3,1450 4,287 3,563 6,534 2,832 1,556 1,556 1,556 1,556 2,532 2,532 2,532 4,530 6,370	1,000 ba'es 15,598 17,856 16,434 14,812 14,304 16,528 17,172 14,963 15,808 15,808 21,879 16,910 16,910 11,383

Bureau of Agricultural Economics. Compiled from Bureau of Census Reports. Linters are excluded. Quantities are in running bales, round bales counted as half bales and foreign in 500-pound bales.

Table 133.—Cotton: Mill consumption of American and other growths in the world, United States, and foreign countries, 1913-14 to 1930-31

		World		יס	nited Stat	tes	For	eign coun	tries
Year beginning August <sup>1</sup>	All growths	Ameri- can	Other growths	All growths	Ameri- can	Other growths	All growths	Ameri- can	Other
1913-14	20, 671 21, 978 21, 109 18, 516 16, 705 19, 300 16, 905 19, 910 21, 225 19, 782 22, 642 23, 930 25, 860 25, 285	1,000 bales 2 13, 825 13, 249 12, 361 10, 871 9, 909 10, 268 10, 268 11, 898 12, 2446 10, 917 13, 311 14, 010 15, 748 15, 226 13, 021 11, 113	1,000 bales 3 8,375 7,422 8,939 8,518 7,645 6,796 7,402 6,637 7,781 8,879 9,005 9,331 9,920 10,121 9,920 11,287	1,000 bates <sup>3</sup> 5,577 5,597 6,398 6,769 6,566 5,766 6,420 4,893 5,910 6,686 6,456 7,190 6,456 7,190 6,456 7,190 6,566 7,190 6,566	1,000 bales 3 5,383 5,375 6,081 6,470 6,382 5,590 6,003 4,677 5,613 6,322 5,353 6,176 6,853 6,778 5,803 5,904	1,000 bales 2 104 222 317 319 184 417 216 297 344 328 276 280 310 299 299 313 303	1,000 bales 1 16, 623 15, 574 11, 5580 14, 320 11, 950 12, 880 12, 880 14, 659 14, 659 14, 679 18, 451 18, 671 18, 671 18, 671 18, 772 17, 139	1,000 bales 1 8, 442 7, 874 6, 958 6, 991 4, 489 5, 591 6, 596 6, 124 7, 394 8, 863 9, 041 8, 443 7, 218	1,000 bales 1 8, 181 7, 200 8, 622 8, 222 6, 622 7, 461 6, 622 7, 484 8, 587 9, 045 9, 941 10, 242 11, 156

Bureau of Agricultural Economist. Compiled from reports of the Bureau of the Census, U. S. Department of Commerce, except consumption figures for American cotton in foreign countries which are from the 1931 Cotton Year Book of the New York Cotton Exchange. The consumption figures for Other Growths in the world and in foreign countries were obtained by deduction.

<sup>&</sup>lt;sup>1</sup> Total distribution usually is greater than total supply due principally to the inclusion, in all distribution items, of the "city crop," which consists of rebaled samples and pickings from cotton damaged by fire and weather.

<sup>&</sup>lt;sup>1</sup> Year beginning Aug. 1, except 1913, which is the year beginning Sept. 1.
<sup>3</sup> American in running bales and other growths in bales of 478 pounds net. Prior to 1919-20 the quantities given for world consumption of all growths were reported in bales of 500 pounds net and have been converted to equivalent 478 pounds bales.

Table 134 .- Cotton: Consumption by domestic mills, 1919-20 to 1930-31, inclusive

						Crop	ye.r					
Month	1919-20	1920-21	1921-22	1922-23	1923-24	1924–25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-01
August September October November December Jamusy February March April May June June	1,000 bales 497 491 556 491 512 562 516 576 567 541 555	1,000 bales 484 451 333 295 367 395 438 409 441 462 410	1,000 bales 467 485 494 528 511 527 472 520 444 495 509 458	1,000 bales 526 494 534 579 610 567 624 577 621 542 463	1,600 bales 492 496 543 533 464 578 509 486 479 414 350 347	1,000 bales 357 438 534 495 534 551 583 587 532 494 484	1,000 bales 451 453 544 576 582 565 636 578 516 519 462	1,000 bales 500 571 568 584 603 603 590 693 618 630 660 570	1,000 bales 634 627 539 536 573 581 525 577 510 440	1,000 bales 526 492 616 611 533 668 595 632 632 669 570 547	1,000 bales 559 546 640 541 453 576 494 508 532 473 405 379	1,000 bales 353 393 413 415 406 450 433 491 509 465 454 451
Total	6, 420	4, 893	5, 910	6, 666	5, 681	6, 193	6, 456	7, 190	6, 834	7, 091	6, 106	5, 263

Bureau of the Census. Quantities are in running bales, round counted as half bales and foreign in 500 pound bales. Linters not included.

Table 135.—Cotton: International trade, average, 1925-26 to 1929-30; annual, 1927-28 to 1930-31

		-			Year be	ginning	July			
Country	1925-	rage, -26 to 9-30	192	7–28	1928	3-29	192	-30	1930	-31 1
	E\- ports	Im- ports	Ex- ports	Im- ports	Ez- ports	Im- ports	E7- ports	Im- ports	Ex- ports	Im- ports
PRINCIPAL EXPORTING COUNTRIES United States. British India Egypt. Brazil Argentina.	2, 938 1, 484 119	1,000 bales 399 176 0	1,000 bales 7,890 2,528 1,377 62 41	1,000 bales 367 187 0 0	1,000 bales 8,520 3,250 1,645 53 113	1,000 bales 476 88 0	1,000 bales 7,096 3,270 1,394 290 129	1,000 bales 414 117 0	1,000 bales 7,048 3,152 1,283 109 107	1,000 bales 107 388 0 0
Total	13, 203	576	11, 598	535	13, 581	561	12, 179	531	11, 699	496
PRINCIPAL IMPORTING COUNTRIES										
United Kingdom Japan Germany France Italy Czechoslovakia Belgium Polsmd Canada Netherlands Austria Switzerland Sweden Finland Hungary Estonia Denmark Norway	100 1 4 4 14 0 0 0 0 0 0 0 0 0 0	8, 070 8, 061 1, 900 1, 405 567 307 271 192 149 141 106 39 37 25 21	0 0 392 122 18 0 0 1 0 0 0 0 0 0	2, 460 2, 617 2, 563 1, 023 082 620 376 353 261 193 175 134 111 46 33 26 24 9	0 0 333 108 0 1 21 0 0 2 1 0 0 0 0 0	3, 168 3, 110 1, 757 1, 769 1, 121 566 406 309 306 208 147 139 101 38 46 20 7	0 393 50 2 1 21 0 0 1 1 0 0 0 0	2, 648 2, 859 1, 780 1, 1630 1, 103 518 435 2218 214 119 136 105 30 60 228 27 9	358 43 1 39 0 0 0 0 0 0 0	2, 172 1, 645 1, 694 791 450 358 282 299 215 99 123 36 61 18 28 20 10
Total	447	12, 961	536	12, 615	486	13, 142	400	12, 164	442	11, 034

Bureau of Agricultural Economics. Official sources except where otherwise noted. Bales of 500 pounds gross weight or 473 pounds net. The figures for cotton refer to ginned and unginned cotton and linters but not to mill waste, cotton batting, scarto (Egyptian and Sudan). Wherever unginned cotton has been separately stated in the original reports, it has been reduced to ginned cotton in this statement at the ratio of 3 pounds unginned to 1 pound ginned. Wherever linters are stated separately, they have been excluded from these figures.

<sup>1</sup> Preliminary.

<sup>2 3-</sup>year average.

Table 136 .- Cotton, Middling: Average spot price per pound at 10 markets in stated years

Market and crop	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aver-
Norfolk: 1930-31 1981-32	Cents 11. 93 6. 96	Cents 10.80 6.28	Cents 10. 28 6. 20	Cents 10.61 8.33	Cents 9. 67 6. 14	Cents 9. 79	Cents 10. 58	Cents 10. 63	Cents 10.00	Cents 9.24	Cents 8.80	Cents 8. 98	Cents 10. 11
Augusta: 1930–31 1931–32	11. 28 6. 83	10. 19 5. 99	9.91 5.97	10. 22 6. 16	y. 25	9. 42	10. 28	10.30	9. 67	8.87	8, 56	8. 79	9. 73
Savannah: 1930-31 1931-32	11. 11 6. 68	10.30 6.06		10.36 6.13	9. 43 5. 94	9. 56	10. 41	10.41	9.79	8.84	8.61	8. 86	9. 81
Montgomery: 1930-31 1931-32	10.72 6.30	9.72 5.62	9. 43 5. 56	9.90 5.73	8. 90 5. 55	8. 99	9. 73	9.77	9. 26	8.37	8. 16	8.36	9. 28
Memphis: 1930-31 1931-32	10.88 6.20	9.78 5.39		9.59 5.69	8.71 5.55	9. 01	9. 65	9.74	0.05	8.38	8.16	8.36	9.22
Little Rock: 1930-31 1931-32	10. 78 6. 13		9. 29 5. 36	9.47 5.57	8. 59 5. 46	8. 85	9. 52	9.57	8. 93	8, 27	8.02	8. 27	9. 10
Dallas: 1930-31 1931-32	10. 64 6. 23		9.41	9. 63	8.72 5.42	9. 07	9. 77	9. 78	9. 07	8. 20	7.91	8, 35	9. 19
Houston: 1930-31	11. 24 6. 62		9. 99 5. 72	10. 22 5. 90	9.31 5.73	9. 56	10.28	10.31	9. 60	8, 79	8. 54	8. 70	9.74
Galveston: 1930-31 1931-32	11. 28 6. 72		10. 09 5. 82	10.30 6.02	9.31 5.94	9. 62	10.33	10.37	9.72	8, 90	8.64	8. 82	9.82
1931-32 (Palveston: 1930-31 1931-32 1931-32 1931-32 1909-10 1910-11 1911-12 1912-13 1913-14 1914-15 1915-16 1916-17 1917-18 1918-19 1919-20 1920-21 1921-22 1922-23 1923-24 1924-25 1922-27 1927-28 1922-27 1927-28	12. 28 14. 92 11. 96 12. 07 12. 02 (1) 8. 94 14. 26	13. 49 11. 29 11. 37 13. 11 2 8. 42 10. 40 15. 27	14. 21 9. 61 10. 95 13. 73 7. 02 11. 95 17. 24 26. 76	14. 50 9. 35 12. 15 13. 26 7. 43 11. 50 19. 45 28. 07	14. 85 9. 17 12. 81 12. 98 7. 18 11. 89 18. 34 29. 07	14. 95 9. 53 12. 58 12. 93 7. 87 12. 04 17. 33 31. 07	14.62 10.31 12.61 12.90 8.01 11.48 17.14	14. 54 10. 65 12. 45 12. 95 8. 34 11. 73 17. 94 32. 76	14.70 11.61 12.44 13.11 9.43 11.88 19.51	15.48 11.72 12.29 13.36 9.04 12.61 20.06	15.26 12.07 12.44 3 13.79 1 9.12 1 12.80 3 24.18	14. 30 12. 93 12. 34 13. 34 8. 71 13. 03 25. 41 29. 50	14. 65 10. 85 12. 20 13. 12 11. 68 18. 84 28. 96
1918-19 1919-20 1920-21 1921-22 1922-23 1923-24 1924-25 1925-28 1928-27 1927-28 1928-29 1929-30 1930-31 1931-32 10 markets com-	30. 22 31. 38 34. 03 12. 78 21. 55 24. 22 25. 66 23. 07 18. 01 19. 36 19. 00 18. 57 11. 56	33. 22 30. 38 27. 48 19. 35 20. 74 27. 71 22. 79 16. 14 21. 53 17. 94	35. 22 20. 98 18. 99 22. 08 29. 18 20. 86 12. 68 20. 73 18. 79 18. 08	29. 75 39. 58 17. 65 17. 27 25. 34 33. 68 23. 95 19. 82 19. 99 19. 00 17. 19	29. 44 39. 89 14. 59 . 17. 10 25. 48 23. 66 19. 27 12. 22 19. 26 17. 01 0. 05	40. 28 14. 53 16. 53 27. 51 33. 93 23. 66 20. 26 13. 17 18. 72 19. 14 9. 87	39. 36 12. 85 16. 36 28. 78 31. 96 24. 61 19. 83 13. 82 17. 90	26. 8-40. 69 11. 08 16. 74 25. 52 18. 35 14. 10 18. 94 19. 97 14. 87	41. 41 11. 17 16. 80 28. 42 30. 41 24. 52 18. 11 14. 42 20. 07 19. 23	40.31 11.80 19.31 29.63 30.70 23.56 18.00 15.68 20.77 18.74	1 40.49 0 11.00 1 21.69 1 28.60 29.49 1 24.00 17.56 8 16.40 7 21.10 18.80 13.56	39. 41 311. 49 322. 01 25. 73 3 29. 23 7 24. 03 4 18. 24 7 17. 63 7 21. 48	1 38. 21 16. 55 1 17. 92 3 25. 94 3 30. 33 5 24. 21 4 19. 71 3 14. 74 5 19. 98 8 18. 98
bined: 1915-16 1916-17 1917-18 1918-19 1919-20 1920-21 1921-22 1922-23 1923-24 1924-25 1925-26 1926-27 1927-28 1928-29 1928-29 1928-29 1928-30 1930-31	3 8. 80 14. 32 25. 24 31. 00 31. 50 34. 78 12. 53 24. 22 27. 16 23. 31 17. 68 19. 16 18. 72 18. 00	15. 31 22. 08 33. 38 30. 30 28. 24 10. 50 20. 72 27. 67 6 22. 74 6 23. 23 15. 96 21. 19 17. 72 18. 01	17. 38 26. 80 31. 11 35. 44 21. 38 19. 22 22. 11 28. 90 23. 29 20. 94 12. 40 17. 62 9. 82	19. 54 28. 21 29. 27 39. 59 17. 83 5 17. 83 5 17. 83 6 19. 92 12. 17 19. 74 19. 74 11. 79 11. 79 11. 79	18. 44 29. 19 29. 22 39. 70 14. 03 17. 47 25. 40 34. 39 23. 40 19. 31 11. 81 18. 99 19. 07 16. 64	81. 05 28. 51 40. 46 14. 42 17. 04 27. 39 23. 53 20. 04 12. 72 18. 44 16. 56 9. 37	20. 56 39. 49 12. 93 16. 73 28. 62 31. 73 24. 51 19. 63	32. 8- 26. 40 40. 68 11. 19 30. 21 28. 51 25. 51 18. 33 13. 76 19. 78	19. 72 32. 87 26. 84 41. 74 11. 01 26. 92 28. 28 30. 25 24. 56 18. 05 11. 08 19. 76	20. 16 29. 32 29. 21 41. 01 11. 55 29. 22 28. 47 30. 32 23. 61 17. 95 15. 38 18. 23 18. 23	24. 33. 10 31. 84 40. 58 5 10. 77 2 21. 58 2 29. 37 24. 19 5 16. 10 3 16. 10 18. 36 18. 36	25. 45. 45. 45. 45. 45. 45. 45. 45. 45. 4	18. 96 29. 02 29. 76 3 38. 34 18. 09 7 25. 83 2 30. 14 5 24. 22 19. 68 4 14. 40 18. 67 18. 67

Bureau of Agricultural Economics. Prior to Aug. 18, 1915, compiled from quotations in Market Reports of the New York Cotton Exchange, except Sept. 23 to Nov. 18, 1914, when the exchange was closed, quotations for which time were taken from the New York Commercial and Financial Chronide; from Aug. 18, 1915, compiled from daily reports to the bureau from the cotton exchanges of the various markets. Data for earlier years appear in previous issues of the Yearbook.

<sup>&</sup>lt;sup>1</sup> Market closed.

No quotations prior to Sept. 23. Average for 7 days' business.
 Does not include Savannah.

Table 137.—Cotton: Average staple premiums at New Orleans and discounts at New Orleans, Houston, and Galveston for Middling spot cotton, by months, 1924–25 to 1930–31

PREMIUMS FOR STAPLES LONGER THAN % INCH, NEW ORLEANS

Crop year and staple length	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aver- age
1924-25  1546 inch	60 75 100 175 275	Points 60 75 106 175 281 412	65 75 125 175 300	Points 65 75 125 225 375 525	Points 85 80 125 250 400 550	65 80 160 300 530	65 85 175 400 650	85 80 175 460 650	90 250 550 800	110 250 530 800	120 250 550 800	Points 75 110 250 500 800 1, 150	Points 66 88 174 302 555 813
1925-28  15(s inch	100 250 550 800	75 100 194 257 625 887	75 100 175 300 575 800	75 105 231 375 537 850	85 115 250 400 600 900	100 125 250 400 600 900	90 120 250 400 600 900	80 110 200 350 550 900	80 100 200 350 550 900	75 100 200 350 550 900	75 100 200 350 550 900	75 100 200 350 550 900	80 106 217 372 591 907
1926-27  1516 inch	75 200 350 550	65 110 200 350 550 900	235	65 100 139 239 450 800	65 100 150 250 450 840	65 100 150 250 450 875	65 100 150 250 450 900	65 100 150 250 450 900	65 100 150 250 450 900	65 100 200 300 500 900	65 100 200 300 513 900	65 100 200 300 590 900	58 100 168 277 484 730
1927-28  1546 inch	40 75 163 244 525	40 75 169 263 513	75 250 350 550	40 75 238 338 513	50 100 200 300 400	40 100 200 300 400	35 100 200 300 400	35 100 200 800 400	25 75 175 250 350	20 60 175 250 350	20 60 170 245 340	20 60 150 225 300	34 80 191 240 420
1)4 inches	788 20 60 1 150 225	788 20 60 150 206 300	30 84 150 200 300		20 85 150 200 300	15 75 150 200 300	19 75 150 200 300	25 75 150 200 300	25 92 150 200 300	37 104 163 230 345	40 118 200 275 400	475 40 125 225 300 425	661 27 87 162 220 323
1 inches	- 10 - 125 - 225 - 300 - 425	31 103 175 225 325	1 488 1 30 1 100 1 175 225 325 575	1 100	450 40 100 17.5 22.5 35.0 600	450 49 100 175 225 370 600	100 173 225	30 100 175 225 350 600	50 100 175 225 350 600	540 100 175 225 350 600	50 100 175 225 350 600	750 50 100 175 225 350 C00	43 102 179 231 350 603
1930-31 154s inch	100 175 225 350	100 175 225 350	75 150 175 300	75 150 175 300		175	75 150 175 300	40 75 150 175 300 1 600	40 75 150 175 300 1 600	40 75 150 175 300 1 600	10 75 150 175 300 1 600	40 75 150 175 300 1 600	42 79 154 183 308 1 600

DISCOUNTS: FOR 1316 INCH, AVERAGE OF NEW ORLEANS, HOUSTON, AND GALVESTON

1924-25	50	50	50	75	100	100	100	100	100	100	100	100	85
1925-26	150	150	150	150	150	125	125	100	100	100	100	100	125
1926-27	100	100	100	100	100	100	100	100	100	100	100	100	100
1927-28	75	75	75	100	125	125	100	100	100	100	75	75	94
1928-29	50	50	50	65	65	75	75	75	75	75	75	75	67
1929-30	75	75	100	125	150	150	125	100	100	100	100	100	108
1930-31	100	100	100	100	100	100	95	95	95	80	88	85	95

Bureau of Agricultural Economics. Based on weekly quotations for Middling %-inch staple. Premiums and discounts are stated in points or hundredths of a cent per pound. See Table 288, p. 852, 1928 Yearbook, for data for earlier years.

I Nominal.

Discounts are calculated from actual sales and partially estimated.

Table 138.—Cotton: Average monthly premiums and discounts for grades <sup>1</sup> above and below Middling for the 10 designated spot markets, 1927-28 to 1930-31

	Mid-	Strict	Good	Strict	Mid- dling	Strict	Low	Strict	Good
Month and crop year	dling fair	Good Mid- dling	Mid- dling	Mid- dling	(average price) 2	Low Mid- dling	Mid- dling	Good Ordi- nary <sup>8</sup>	Ordi- nary <sup>8</sup>
A					Cents				
August: 1927-28	On 4 130	On 106	On 76	On 51	per lb. 19, 16	Off 4 103	Off 213	Off 333	Off 448
1928-29 1929-30 1930-31	54 50	60	39	26	18. 72	44	98	164	23 l 340
1930-31	90	62 74	48 57	32 37	18.04 11.11	75 71	160 172	250 287	340 389
September:			1	1					
1927-28 1928-29	125 83	102 59	73	49 25	21 19 17. 72	100 67	211 138	333 209	447 285
1929-30	72	55	40	25	18.01	75	159	252	342
1930-31October:	97	70	51	31	10.15	70	169	279	330
1927- 28	124	101	68	48	20.35	82	187	307	417
1929-29	83 71	62 56	41 42	26 26	18. 46 17. 62	79 77	159 165	237 268	321 359
1930-31	89	70	51	30	9.82	70	163	265	359
	105	1 83	60	47	10.74	48	124	221	314
1927-28	81 78	61	41	41 26	19. 74 18. 70	81	161	242	327
1920-30	78 89	60	46	30 30	16.75	78	170	278	375 359
December:	89	70	51	30	10.00	70	162	261	339
1927-28	94	69	45	30	18. 99	36	85	162	241
1928-29 1929-30	7ਨ 83	58 67	39 52	25 37	19. 07 16. 61	79 75	157 173	238 280	322 378
1930-31	88	70	51	30	9. 16	66	151	243	339
January: 1927-28	93	68	44	29	18.44	35	80	150	227
1927-28	77	68 57 85	39	25 49	18, 87	78	162	247	336
1929-30	103	85	69 51	49 30	16.56 9.37	75 60	170 138	280 220	378 295
		10	OI	30	9.01				1
1927-28	91	65	40	25	17.60	34	74 162	148 250	220 310
1929-30	78 107	58 89	39 72	26 50	18.86	78 75	170	280	378
1927-28 1923-29 1929-30 1930-31	87	70	51	30	15. 11 10. 12	54	132	210	277
March: 1927-28	1	65	40	25	18.76	33	73	138	213
1928-20	79	59	41	25 28	19.77	77	161	250	340
1929-30. 1930-31.	105	88	72 52	50 31	14.74	73 51	174 127	282 204	384 269
A mil.	1	'-		1	1	1			1
1927-28	90	64	39 42	25	19. 77 18. 94	33 76	73 161	138 250	213 340
1927-28 1928-29 1929-30 1930-31	100	60 86	72	29 50	15.40	72	178	290	395
1930-31 May:	88	70	52	31	9. 50	51	125	197	201
1927-28	. 89	64	40	25	20. 53	33	77	143	218
1928-29	80	61	43 71	80 49	18. 24	75 72	160 173	250 290	340
1927-28	88	86 70	52	31	15. 12 8. 70	50	117	190	252
June:	1	-	-	-	1	0.4	80	147	222
1927-28 1928-29	87	63 64	40 49	26 35 49	20. 82 18. 36	34 74	160	250	340
1929-30 1930-81	101	86	71	49	13. 21	72	175	293	340 395
Tralyza	1	70	52	31	8. 42	50	101	176	237
1927-28	. 85	61	39	26	21, 25	37	86	153	227
1928-29	101	85 86	51 71	38 50	18. 29 12. 21	73 71	160 175	250 293	840 398
1927-28	88	70	52	31	8.66	49	100	175	236
A verage:	1	1	1	00	10 70		114	198	294
1927-28 1928-29	100 81	76	50 42	33 28 41	19. 72 18. 67	51 78	153	236	322
1929-30	- 92	60 76	61		15.79	74	153 170	278	376
1930-31	.] 88	70	52	31	9. 61	59	138	226	804

Bureau of Agricultural Economics.

<sup>1</sup> White standards.
2 Based on %-inch staple.
3 These grades are not deliverable on future contracts.
4 The differences are stated in terms of points or hundredths of a cent per pound. By "On" is meant that the stated number of points is to be added to the price of Middling and by "Off" is meant that the stated number of points is to be subtracted from the price of Middling.

<sup>100446°-32-43</sup> 

Table 139.—Cotton: Estimated average price per pound received by producers, United States, 1922-23 to 1931-32

Crop year	Aug. 15	Sept.	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Weight- ed aver- age
1922-23 1923-24 1924-25 1925-26 1925-26 1925-27 1927-28 1928-20 1928-30 1930-31 1931-32	Cents 20.9 23.8 27.8 23.4 16.1 17.1 18.8 18.0 11.4 6.3	Cents 20. 6 25. 6 22. 2 22. 5 16. 8 22. 5 17. 6 18. 2 9. 9 5. 9	Cents 21. 2 28. 0 23. 1 21. 5 11 7 21. 0 18. 1 17. 5 9. 2 5. 8	Cents 23. 1 29. 9 22. 5 18. 1 11. 0 20. 0 17. 8 16. 2 9. 6 6. 1	Cents 24, 2 32, 1 22, 2 17, 4 10, 0 18, 7 18, 0 16, 0 8, 7 5, 5	Cents 25. 2 32. 5 22. 7 17. 4 10. 6 18. 6 17. 9 15. 8 8. 6	Cents 26. 8 31. 4 23. 0 17. 6 11. 5 17. 0 18. 0 14. 8 9. 1	Cents 28. 0 27. 7 24. 5 16. 5 12. 5 17. 8 18. 8 13. 8 9. 6	Cents 27. 6 28. 7 23. 7 16. 6 12. 3 18. 7 18. 5 14. 7 9. 3	Cents 26, 2 28, 1 23, 0 16, 0 13, 9 20, 1 18, 0 14, 5 8, 8	Cents 25. 9 27. 8 23. 0 16. 1 14. 8 19. 7 17. 9 14. 0 7. 7	Cents 24.8 27.3 23.4 15.4 15.5 21.0 17.8 11.9 8.5	Cents 22.8 28.7 22.9 19.6 12.5 20.2 18.0 16.8 9.5

Bureau of Agricultural Economics. Based upon returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by beles marketed monthly. Mean of prices reported on 1st of month and 1st of succeeding month, August, 1909, to December, 1923.

Table 140.—Cotton: Average spot price per pound of specified descriptions at Liverpool, 1922-23 to 1931-32

Description and crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aver-
American Middling:1 1922-23 1923-24 1924-25 1925-26 1926-27 1927-28 1928-29 1929-30 1930-31	24. 90 28. 18 31. 62 26. 28 19. 69 21. 10 21. 39	23. 98 31. 99 25. 06 26, 25 19. 35 24. 17 20. 87 20. 95 12. 64	24. 55 31. 96 26. 13 23. 17 14. 51 23. 36 21. 85 20. 47	27. 96 35. 74 26. 09 21. 51 14. 08 22. 73 21. 62 19. 61 12. 05	23, 26 36, 00 25, 73 20, 31 13, 34 21, 98 21, 57 19, 22 11, 03	30. 04 34. 33 25. 90 21. 68 14. 55 21. 68 21. 39 18. 97 11. 11	30. 93 32. 53 27. 17 21. 40 15. 56 20. 53 21. 09 17. 36	31. 42 29. 77 27. 95 20. 32 15. 65 21. 80 22. 33 16. 83	30. 29 33. 15 26. 85 20. 31 16. 24 22. 75 21. 56	28, 43 32, 00 25, 83 20, 73 17, 90 23, 52 20, 66 17, 47	31. 53 30. 74 27. 84 19. 98 18. 55 23. 82 20. 88 16. 16	29. 28 30. 38 27. 76 19. 76 19. 42 24. 44 21. 09	28. 51 31. 90 26. 12 21. 82 16. 57 22. 66 21. 36 18. 43
Egyptian uppers, good: 1 1922-23 1922-23 1923-24 1924-25 1925-26 1926-27 1927-28 1928-29 1929-30 1930-31 1931-32 1931-32	28. 1 31. 5 45. 6 39. 5 26. 0	27. 4 33. 4 35. 5 37. 1 28. 0 33. 2 25. 1 24. 2 18. 0 10. 2	27. 8 33. 5 34. 3 35. 0 23. 8 31. 8 25. 9 24. 5 9. 6	30. 7 39. 6 35. 4 32. 6 22. 2 31. 3 25. 6 22. 3 14. 0 9. 6	31. 2 41. 5 37. 5 30. 8 19. 4 29. 9 25. 5 22. 0 13. 0 8. 7	31. 9 39. 7 40. 3 29. 9 21. 8 28. 3 25. 5 22. 0 13. 4	32. 5 39. 0 41. 3 28. 5 24. 3 27. 6 25. 0 21. 4 15. 0	33. 9 37. 5 45. 1 26. 2 23. 5 30. 0 26. 7 21. 3 15. 0	33. 0 41. 2 43. 6 25. 9 23. 3 32. 7 25. 7 21. 8 14. 0	30. 4 43. 9 42. 1 27. 3 26. 7 33. 3 24. 0 21. 6 13. 4	31. 9 43. 3 41. 6 26. 2 28. 3 31. 3 23. 5 20. 5 12. 6	31. 0 43. 6 41. 4 25. 2 30. 2 30. 4 23. 7 20. 8 13. 1	30. 8 39. 0 40. 0 30. 3 24. 4 31. 8 25. 3 22. 0 14. 6
No. 1 Oomras, fully good: 2 1922-23 1923-24 1924-25 1925-26 1926-27 1927-28 1928-29 1929-30 1930-31	19.6 23.4 21.5 15.5 17.9 16.0	18. 9 21. 8 19. 7 22. 0 15. 4 20. 1 14. 7 15. 0 7. 8 5. 9	18.8 22.0 22.3 19.9 12.5 19.3 15.7 7.7 6.2	20. 6 25. 9 23. 3 18. 1 12. 1 17. 7 15. 9 13. 9 8. 2 6. 7	20. 5 27. 7 23. 5 16. 8 11. 5 17. 6 16. 4 13. 7. 4 6. 5	21. 9 26. 1 22. 6 17. 4 12. 5 17. 4 17. 1 13. 2 7. 4	22. 2 25. 2 23. 5 16. 8 13. 3 16. 5 15. 8 11. 5 8. 4	21. 7 22. 4 23. 2 15. 4 13. 4 17. 5 16. 9 10. 8 8. 4	20. 7 24. 0 22. 2 15. 1 13. 9 17. 9 15. 5 11. 0 7. 9	19. 4 22. 9 21. 2 15. 6 15. 4 18. 3 14. 8 10. 8 7. 5	20, 8 22, 6 21, 6 15, 0 16, 2 18, 6 15, 1 9, 6 7, 8	20, 2 22, 0 22, 0 15, 2 17, 0 18, 5 15, 3 8, 7 7, 8	20. 5 23. 5 22. 4 17. 4 14. 1 18. 1 15. 8 7. 8

Bureau of Agricultural Economics. Conversions at monthly average rates of exchange August 1922– December 1925 and September, 1931 to date, and at par January 1925–August 1931, as given in Federal Reserve Bulletins.

<sup>&</sup>lt;sup>1</sup> International Yearbook of Agricultural Statistics, 1921, p. 443. London Economist, 1922 to August 1927. Subsequently from Liverpool Cotton Association Dally Report. Average of weekly quotations. <sup>2</sup> London Economist, average of weekly quotations to August, 1927, inclusive. Subsequently from Liverpool Cotton Association Dally Report.

Table 141.—Cottonseed: Estimated production, and estimated price December 1, by States, 1924-1931

State	P	roduc	tion,	year l	eginı	ing A	ugus	t1		Esti	mate	d pric	e per	short	ton	
50406	1924	1925	1926	1927	1928	1929	1930	1931	1924	1925	1926	1927	1928	1929	1930	193
	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000								
	snort	short	short	ahort	short	8hort	short	short	Dol-	Dol-		Dol-	Dol-	Doi-	Dot-	14
issouri	tons 86	tons 133	tons		tons	tons	tons	tons	lars	lars	lars	lars	lars	Lars	00 00	10
rginia	17	23	97 23	14	65 19	98 21	67 19	120	32. 40	36.00 35.00	10. 80	30. 90	30.00	31.00	20.00	11
orth Carolina	866		539	382	371	331		244	25.00	32.00	20.00	27 00	40.00	20 00	22 00	12
uth Carolina	357	391	448	324	322	368	444	150	20.00	33, 00 32, 00	21 00	30 50	30 W	28 00	22.00	12
orgia	445			488	457	590	707	#100 #10	34 10	33, 00	21.00	38 50	37 00	28 00	21.00	11
orida	10	17	14	-8	700			10	32 10	34.00	19 00	30.50	36 00	30.00	22.00	10
nnessee	157	229		159		229		269	35, 20	25, 50	19.00	37, 00	138, 00	129.00	21. 75	9
abama	438	602	665	529	492	596		636	34, 30	29.00	19.00	37. 00	138, 00	129.00	20.00	111
ississippi	487	884	838	602	655	851	650	786	35, 70	122 00	21 00	38 M	N39. 00	132.50	N23. 50	)111
kansas	486		687	444	554		388	825	33. 20	18.30 24.50	17. 50	36. 50	37, 50	29.00	21.00	) 8
ouisiana	219	404	368		307		317	384	29. 20	24. 50	18.00	33. 00	32. 50	31.00	20.00	) 8
clahoma	671	751	787	461	536	508	379	1 640	റ മറ	เเจน แก	41 E 40	1107 M	NO 4 TVI	1121 IX	HVZ II	11 >
	2, 197	1.849	2, 499	1, 938	2, 274	1, 755	1, 794	2,348	31. 10	28, 50 28, 60 26, 60 40, 00	17. 50	36.00	35, 00	32.00	122. U	110
ew Mexico	25	30 53 54	33	31	39	40	44	44	30.00	28,00	18,00	30. 00	32.00	28, 0	22 U	11.
izona	48	53	54	41	66	_68	69	53	21, 20	26.60	18.00	30. 00	30.00	26. O	20. 0	115
alifornia	35	11	58 8	40	76	115	117	80	40.00	40.00	20.00	37. 5L	31. 50	27. 00	21. 00	110
ll other	0	11	8	4	3	4	3	4	34. U	36. 00	20.00	37. 25	37. 33	28, 2	21. 2	710
United States	A OFT	7 150	7 000	5 750	0 195	0 500	g 105	7 500	20.00	07 07	10 00	00 00	20 00	20 25	21 8	1110

Bureau of Agricultural Economics.

Table 142.—Cottonseed oil: International trade, average 1925-1929, annual 1927-1930

					Calend	ar year				
Country	A vei 1925-	rage, -1929	19	27	19	28	19	29	193	0 1
	Ex- ports	Im- ports	E <sub>λ</sub> - ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports
PRINCIPAL EXPORTING COUNTRIES	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds 0	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
United States	40, 146 22, 724 9, 526 351	18,657 80 0 23	47, 044 31, 229 15, 596 0	17,315 0 0 16	35,708 17,579 11,077 21	16, 742 3 0 0	26, 181 3, 047	23,090 2 0 4	24,717 0,947 2,314	00, 055
						16, 745			101, 110	36, 037
Principal importing Countries										
Canada Germany Notherlands France Denmark Norway Cuba Sweden Belgium Australia 2 Greece Argentina Gambia 2 Yugoslavia Uruguay Czechoslovakia Italy	3 283 6, 481 34 809 0 447 15 10 53 9	19, 296 16, 831 7, 933 6, 624 4, 474 4, 099 2, 824 2, 480 1, 914 1, 478 1, 470 622	9,838 55 609 0 1,097 4 3 0 210 0	25,897 24,370 7,597 6,131 5,582 6,081 3,295 3,918 1,664 8,315	20 7, 284 2 1, 224 0 49 51 0 0 17 4 0	12, 984 8, 685 7, 142 6, 493 2, 798 1, 857 2, 721 2, 026 2, 967 1, 201 979 979 368 331	912 3, 815 52 1, 369 0 473 11	13, 640 7, 474 8, 628 7, 878 2, 648 419 3, 071 1, 782 2, 651 494 1, 340 453 181 3 39 328	1,472 119 61 0 0 102 0 6 6 0 0 0	12, 283 810 8, 836 4, 884 1, 884 1, 824 3, 082 687 36 147 210 290
Total	8, 133	110, 758	11,851	146, 498	8, 631	96, 430	6, 701	89,768	1,761	61,48

Bureau of Agricultural Economics. Official sources except where otherwise noted.

<sup>&</sup>lt;sup>1</sup> Compiled from reports of Bureau of Census. Estimated production of lint, by States (December preliminary estimate for 1931), in rounded thousands of 500 pounds gross weight bales, adjusting for net weight and assuming 65 pounds of cottonseed for each 35 net pounds of lint.

<sup>&</sup>lt;sup>1</sup> Preliminary.

<sup>2</sup> International Yearbook of Agricultural States.

<sup>1 4-</sup>year average.

Table 143.—Cottonseed: Estimated average price per ton received by producers, United States, 1922-23 to 1931-32

Crop year	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Weight- ed average
1922-23 1923-24 1924-25 1925-26 1925-26 1926-27 1927-23 1928-29 1929-30 1930-31	Dolls. 32. 44 37. 47 38. 44 36. 52 29. 73 25. 95 36. 87 32. 69 23. 99 14. 71	40. 88 31. 74 33. 48 27. 38 34. 41 31. 02 31. 03 23. 89	31. 79 40. 90 31. 95 32. 82 20. 06 36. 60 34. 08 31. 40 20. 73	40. 18 45. 92 33. 57 27. 64 18. 66 37. 51 30. 75 21. 28	42. 93 45. 54 35. 48 27. 87 18. 05 37. 14 37. 74 30. 31 21. 28	43. 35 44. 37 37. 50 28. 40 18. 55 37. 40 38. 05 28. 95 21. 25	45. 16 43. 27 37. 14 29. 06 22. 39 37. 44 38. 73	46. 82 41. 34 38. 21 29. 47 25. 43 37. 77 39. 36 28. 63	47. 60 40. 42 37. 94 31. 51 25. 80 39. 40 38. 94 29. 74	46. 58 40. 53 38. 61 30. 84 26. 05 43. 00 37. 78 30. 61	39, 96 36, 66 31, 89 26, 27 41, 25 35, 83 29, 66	39. 07 36. 41 31. 31 26. 59 39. 27 34. 84 27. 35	34. 70 42. 23 34. 08 30. 82 21. 55 35. 94 35. 26 30. 43

Bureau of Agricultural Economics. Based upon returns from special price reporters. Monthly prices by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by monthly receipts at oil mills.

Table 144.—Cottonseed and cottonseed products: Production in the United States, 1909-10 to 1930-31

	Cott	onseed	Cotton	seed pr	oducts	77	Cott	onseed	Cotton	seed pr	oducts
Year be- ginning August	Pro- duced	Crushed	Crude oil	Cake and meal	Hulls	Year be- ginning August	Pro- duced	Crushed	Crude oil	Cake and meal	Hulls
1909-10	1,900 short tons 4, 462 5, 175 6, 997 6, 104 6, 305 7, 186 7, 186 4, 992 5, 113 5, 040 5, 360 5, 074	1,000 short tons 3,269 4,106 4,921 4,580 4,848 5,780 4,202 4,479 4,252 4,479 4,013	1,000 short tons 491 630 756 697 725 860 627 704 656 663 606	1,000 short tons 1,326 1,792 2,151 1,999 2,220 2,648 1,923 2,225 2,088 2,170 1,817	1,000 short tons 1,289 1,375 1,642 1,540 1,400 1,407 1,220 969 986 1,137 1,143	1920-21 1921-22 1922-23 1922-24 1924-25 1925-28 1926-27 1927-29 1928-29 1929-30 1930-31	1,000 short fons 5,971 3,531 4,336 4,502 6,051 7,150 7,989 5,758 6,435 6,590 6,185	1,000 short tons 4,069 3,008 3,242 3,308 4,605 5,558 6,306 4,654 5,061 5,016 4,714	1,000 short tons 655 465 501 490 702 809 944 738 802 721	1,000 short tons 1,786 1,355 1,487 1,518 2,126 2,597 2,840 2,093 2,282 2,212 2,162	1,000 short tons 1,256 937 944 941 1,331 1,547 1,854 1,320 1,368 1,384 1,303

Bureau of Agricultural Economics. Compiled from reports of the Bureau of the Census.

Table 145.—Cottonseed oil, crude: Average price per pound in tanks, f. o. b. southeast mills, by months, 1922-23 to 1931-32

Crop ye.r	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aver- age
1922-23 1923-24 1923-25 1925-26 1925-26 1920-27 1927-28 1928-29 1928-29 1928-30 1930-31 1931-32	Cents 8. 50 11. 30 10. 88 8. 70 6. 76	9. 94 8. 34 9. 14 8. 19 9. 25 8. 16 7. 66	Cents 7. 34 9. 44 9. 03 8. 55 7. 44 9. 45 8. 14 7. 33 6. 14 3. 54	9. 88 8. 85 8. 90 6. 64 9. 05 8. 24 7. 38 6. 35	8. 52 9. 45 9. 69 8. 98 6. 36 8. 72 8. 38 7. 26 6. 12	9. 46 9. 48 9. 75 6. 94 8. 48 8. 63 7. 24 6. 18	8. 84 9. 20 10. 71 8. 20 7. 75 9. 12 7. 40	10. 45 8. 46 9. 95 11. 00 7. 73 8. 44 9. 00 7. 13	8. 74 10. 00 11. 22 7. 33 8. 75 8. 37 7. 48	9. 88 8. 20 9. 34 12. 17 7. 74 8. 88 7. 94 7. 32	9. 75 8. 78 9. 75 8. 04	9. 00 10. 06	9. 02

Bureau of Agricultural Economics. Compiled from the Oil, Paint, and Drug Reporter; prices, 1922–23 to 1927–28 are averages of weekly quotations; beginning 1928–29, averages of daily quotations.

Data for 1909–10 to 1921–22 are available in the 1930 Yearbook, p. 695, Table 149.

Less than 10 quotations during the month. Other quotations were bids.

Table 146.—Cottonseed oil, prime summer yellow: Average spot price per pound, New York, 1922-23 to 1931-32 1

Crop year	Aug.	Sept	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aver- age
1922-23 1923-24 1924-25 1925-28 1925-28 1927-27 1927-28 1928-29 1929-30 1930-31 1931-32	Cents 9. 96 10. 34 13. 83 11. 09 12. 99 9. 89 9. 44 9. 27 8. 34 5. 77	8. 54 11. 62 10. 54 10. 81 11. 42 10. 74 10. 03 9. 19 8. 20	8. 88 12. 01 11. 00 9. 86 8. 82 10. 83 9. 84 9. 23 7. 60	9. 51 11. 67 10. 86 10. 32 8. 20 10. 55 9. 69 9. 01 7. 57	9. 81 11. 00 11. 41 10. 47 8. 22 10 06 10. 21 8. 77 7. 28	10. 77 11. 00 11. 10 11. 33 8. 50 10. 02 20. 33 8. 46 7. 20	10. 90 10. 03 10. 69 11. 28 9. 31 9. 27 10. 88 8. 46	11. 78 9. 77 11. 10 12. 24 9. 39 9. 64 10. 74 8. 41	11. 76 10. 09 11. 08 12. 38 8. 78 10. 04 10. 11 8. 80	11. 60 9. 82 10. 51 14. 48 9. 09 10. 52 9. 75 8. 76	11.48 10.42 10.75 15.38 9.19 10.22 9.64 8.23	10. 85 11. 98 11. 38 14. 99 9. 57 10. 03 9. 62 7. 99	10.44 10.81 11.19 12.05 9.46 10.15 10.02 8.72

Bureau of Agricultural Economics. Compiled from Oil, Paint, and Drug Reporter average of daily ranges. Data for 1890-91 to 1921-22 are available in 1924 Yearbook, p. 766, Table 323.

Table 147.—Cottonseed meal, 41 per cent protein: Price per ton, Memphis, 1922-23 to 1931-32

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aver- age
1922-23 1923-24 1924-25 1925-20 1926-27 1927-28 1928-29 1929-30 1930-31 1931-32	Dolls. 35, 30 43, 20 43, 60 44, 10 32, 10 (1) (1) (1) 36, 25 17, 30	34, 30 42, 90 41, 40 36, 90 28, 90 37, 40 38, 40 41, 00 30, 90	40, 25 44, 90 40, 75 34, 40 23, 90 37, 70 43, 90	46. 00 47. 40 38. 75 34. 10 23. 70 39. 60 44. 20 37. 80 27. 50	45. 40 45. 00 39. 25 34. 00 24. 50 41. 40 45. 60 37. 00	45. 75 43. 60 37. 70 32. 00 30. 10 40. 40 44. 90 35. 10 25. 75	45. 00 41. 00 35. 75 31. 10 33. 50 45. 10 44. 40 33. 50	39. 00 35. 90 31. 00 32. 40 49. 30 42. 70	43, 10 39, 50 36, 80 31, 90 32, 50 55, 50 38, 75 30, 75	42, 40 39, 50 38, 40 30, 70 34, 00 61, 50 35, 50 38, 00	40. 80 40. 25 38. 80 31. 00 37. 40 (1) 34. 25 35. 50	41. 40 43. 60 41. 50 31. 10 36. 00 41. 50 38. 75 33. 00	41. 90 42. 50 39. 00 33. (4) 30. 75

Bureau of Agricultural Economics. Compiled from reports made to the bureau.

Table 148.—Cottonsecd meal, 41 per cent protein, bagged: Average price per ton at 11 markets, 1931

Market	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Boston Philadelphia Buffalo Pittsburgh Cincinnati Chicago Milwankee Minneapolis Los Angeles St. Jouis San Francisco	Dolls. 31. 00 33. 75 32. 30 32. 40 31. 00 30. 20 29. 00 31. 70 33. 00 28. 80 33. 50	Dolls. 31. 00 33. 00 31. 40 31. 40 30. 00 29. 80 29. 25 31. 25 31. 50 28. 40 32. 40	Dolls. 34. 20 33. 40 32. 60 30. 60 30. 70 31. 10 31. 60 26. 80 29. 60 30. 10	Dolls. 34, 60 33, 90 32, 50 31, 10 31, 00 32, 40 28, 60 30, 50	Dolls. 33, 40 32, 20 29, 50 30, 80 29, 40 28, 90 30, 50 30, 40 26, 00 27, 70 30, 00	Dolls. 31. 60 32. 80 29. 10 28. 40 27. 20 20. 75 27. 50 20. 60 29. 50	Dolls. 30. 90 29. 20 28. 00 27. 50 26. 20 27. 75 26. 00 27. 75 26. 00 24. 40 28. 00	Dolls. 26. 40 26. 00 23. 20 22. 10 23. 00 22. 50 20. 60 26. 40	Dolls. 22, 25 20, 75 19, 60 18, 30 18, 90 19, 50 21, 60 17, 20 22, 10	Dolls. 22, 25 22, 20 19, 90 19, 50 17, 90 17, 60 20, 40 21, 25 50	Dolls. 26. 30 25. 30 22. 00 22. 70 21. 25 21. 40 22. 20 23. 70 29. 10 21. 25 28. 50	Dolls. 23. 60 23. 00 20. 80 20. 60 19. 30 19. 10 20. 40 21. 20 28. 40 17. 60 28. 75

Bureau of Agricultural Economics. Compiled from reports made to the bureau.

<sup>1</sup> Prices through July, 1930, quoted in barrels; beginning August, 1930, quoted in tanks.

<sup>1</sup> Not reported.

Table 149.—Sugar beets: Acreage, production, and value, United States, 1911-1931

Year	Acre-	Yield per acre	Produc- tion	Season- al farm price per ton	Value	Year	Acte-	Yield per nore	Produc- tion	Season- al farm price per ton	Value
1911 1912 1913 1914 1915 1916 1917 1918 1919 1920 1921	1,000 acres 474 555 580 483 611 665 685 594 692 872 815	Short tons 10.7 10.2 10.1 11.6 10.7 9.0 10.0 9.3 9.8 9.8	1,000 short tons 5,062 5,588 5,585 6,511 6,228 5,980 5,949 6,421 8,538 7,782	Dollars 5. 50 5. 82 5. 69 5. 45 5. 67 6. 12 7. 39 10. 00 11. 74 11. 63 6. 35	1,000 dollars 27, 841 32, 871 33, 491 30, 438 36, 950 38, 139 44, 192 59, 494 75, 420 99, 324 49, 392	1922	1,000 acres 530 657 815 647 721 644 688 775 720	Short tons 9.8 10.7 9.2 11.4 10.7 10.8 11.0 11.0	1,000 short tons 5,183 7,006 7,489 7,381 7,223 7,753 7,101 7,315 9,199 7,933	Dollars 7, 91 8, 99 7, 99 6, 39 7, 61 7, 67 7, 11 7, 08 7, 14 5, 92	1,000 dollars 41, 017 62, 965 59, 835 47, 147 54, 961 59, 455 50, 477 51, 805 65, 697 46, 958

Bureau of Agricultural Economics.

Table 150 .- Sugar beets: Acreage, production and value, by States, 1927-1931

		Ac	enge				P	roduct	ion			Yiel	d per	acre	
State	1927	1928	1929	1930	1931 1	1927	1928	1929	1930	1931	1927	1928	1929	1930	1931
Michigan Nebraska Montana Idaho. W yoming Colorado Utah California Other States ' United States CanedaforU.S.factories	99 82 32 29 37	28 28 27 44 179 51 49 109	52 92 38 48 47 210 45 46 110	74 81 45 44 46 242 44 65 134	acres 59 66 54 34 49 226 49 90	short tons 698 1,036 364 381 431 2,774 677 476 916	short tons 452 1, 021 258 297 462 2, 394 633 942	2 487 4 2, 612 7 565 8 545 2 874 1 7, 315	short tons 513 1, 136 572 446 646 3, 312 553 768 1, 253	short tons 590 891 614 299 550 2, 533 504 1, 067 877	Short tons 7. 0 12. 6 11. 4 13. 1 13. 1 12. 7 12. 7 8. 3 8. 3	tons 6. 4 11. 9 9. 2 11. 0 10. 5 13. 4 12. 5 13. 0 8. 6	tons 5.8 11.5 10.2 10.2 10.4 12.4 11.8 8.0	tons 6. 1 14. 1 10. 1 14. 1 13. 1 12. 1 11. 9.	0 13.5 7 11.4 1 8.8 0 11.4 7 11.2 8 10.3 11.9 9 11.0
Ch. A.			Seas	onal f	arm p	rice						Valu	e		
State	1	927	192	3	1929	193	30	1931	19:	27	1928	1929	19	30	1931
Michigan Nebraska Montana Idaho Wyoming Colorado Utah California Other States <sup>2</sup>	per	Dolls. per short p ton 7. 16 7. 96 8. 22 7. 50 7. 67 7. 84 7. 03 9. 28			Doils. r short ton 7. 94 6. 96 7. 21 7. 11 6. 91 7. 01 7. 0	to t	hort I	Dolls. per shor ton	1,0 dol 4, 8, 2, 2, 3, 21, 4,	/8. 996 241 996 854 303 758 761 418	1,000 iolls. 3, 263 7, 127 1, 897 2, 210 3, 326 16, 687 4, 478 5, 121	2, 81 3, 53 3, 44 18, 10 3, 96 6, 10	doi: 4,32 7,15 4,30 3,95 4,08 22,36 3,36 5,94 9,94	143 - 143 -	1,000 dolls.
United States											50, 477	51,8		697	46, 958

Bureau of Agricultural Economies.

i Most years from 1911 to 1923 include a small unknown quantity of beets grown in Canada for Michigan factories.
Preliminary.

Preliminary.
 Includes Ohio, Indiana, Illinois, Wisconsin, Minnestoa, Iowa, North Dakota, South Dakota, Kansas, New Mexico, and Washington.
 Less than 500 acres.

Table 151 .- Sugar beets: Acreage, yield per acre, and production in specified countries, 1929-1931

Country		Acreage			Yield per acre			Production		
	1929	1930	1931 1	1929	1930	1931 1	1929	1930	1931 1	
Canada United States United Kingdom Sweden Denmark Netherlands Belgium France Spain Italy Germany Austria Czechoslovakia Hungary Yugoslavis Rumania Poland Russia Other <sup>2</sup> Total countries reporting acreage and production, all years	687 231 688 74 136 143 693 151 287 1, 125 75 608 195 145 125 590 1, 905	78	1,000 acres 52 720 234 91 175 91 140 620 240 241 106 441 142 120 380 3,694	Short tons 8.5 10.6 9.7 12.4 13.5 10.9 11.7 11.2 10.9 10.2 10.1 8.3 3.6 7.6	Short tons 9.1 11.9 9.8 14.7 13.7 16.6 14.3 13.0 12.1 13.8 12.2 11.5 8.8 6.4 8.3 11.4 5.9 8.9	Short tons 9.7 11.0 9.6 10.9 12.2 212.3 13.4 10.8 13.6 9.7 12.9 11.1 11.7 8.0	tons 364 7, 316 2, 244 845 1, 000 2, 271 1, 731 1, 753 3, 223 12, 226 6, 121 1, 771 1, 210 984 5, 479 6, 887 572	1,000 short tons 471 9, 199 3, 428 1, 339 1, 179 2, 356 9, 716 2, 560 3, 364 16, 445 1, 073 7, 078 1, 1073 7, 078 1, 691	1,000 short tons 7,933 2,246 9915 1,117 1,876 6,712 3,265 2,613 12,168 1,177 5,144 1,137	
Total, all countries reporting	7, 353	8,468	8, 472					86, 239		

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture.

Table 152.—Beet sugar: Production, United States, 1911-1931

	Acreage		age Roots Suga		Sugar	Analy be	ysis of ets	Recovery of sucrose from beets b		Sugar pro- duced per ton of beets		Beet pulp produced	
Year 1	tories operat- ing	which beets were har- vested	paid for by fac- tories	Beets sliced	pro- duced (chiefly re- fined) <sup>8</sup>	Purity coeffi- clent 4	Per- cent- age of su- crose s	Paid for	Sliced	Paid for	Sliced	Mo- lasses pulp	Dry pulp other than mo- lasses pulp
1911 1912 1913 1914 1915 1916 1917 1918 1919 1920 1921 1922 1923 1924 1925 1926 1927 1928 1929 1929 1929 1931	Nu m- ber 60 73 71 60 67 74 89 99 92 81 89 98 88 88 82 79 77	1,000 acres 474 555 580 611 605 594 692 872 815 536 687 732 646 694 783	1,000 short tons 5,886 6,511 6,228 5,949 6,421 7,782 7,782 7,782 7,782 7,782 7,782 7,782 7,782 7,782 7,782 7,782 7,423 7	1,000 short tons 5,062 5,022 5,224 5,628 6,160 5,920 5,528 7,901 7,414 4,585 7,705 6,903 6,782 7,417 8,789	7,000 short tons 600 693 732 874 821 705 781 705 781 705 881 1,089 11,089 11,061 11,061 11,061 11,018 11,018	Per cent 82, 21 84, 49 83, 22 84, 49 84, 74 83, 89 84, 78 83, 96 83, 79 84, 70 88, 44, 65 83, 79	Per cent 15. 89 16. 31 15. 78 16. 38 16. 49 16. 38 16. 48 15. 77 15. 30 17. 18 16. 17 15. 64 15. 73 15. 64 15. 97	Per cent 12.45 12.93 13.42 13.18.12 12.79 12.75 13.11 13.02 12.57 14.51 12.30 12.29 13.74 13.74 13.83	Per cent 11.84 13.26 12.96 13.65 14.21 13.60 13.64 12.63 13.76 13.64 12.42 14.68 23 14.68 23 14.68 23 14.70	Lbs.  249 259 208 208 256 256 256 255 262 260 251 290 246 246 280 277	Lbs. 237 245 257 272 273 284 277 273 247 273 275 267 308 284 274	74 89 94 111	1,000 short tons 

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>&</sup>lt;sup>2</sup> Includes Irish Free State, Switzerland, Bulgaria, Latvia, Finland, and Australia. <sup>1</sup> Preliminary.

Year shown is that in which beets were grown. Sugar-making campaign extends into succeeding year.
 Including, in some years, a small acreage in Canada used by United States factories.
 Includes a small quantity not made from beets, and also that made at the Johnstown, Colo., molasses

factory.

4 Percentages of sucrose (pure sugar) in the total soluble solids of the beets.

5 Based upon weight of beets sliced, except possibly in a very few factories.

6 Sucrose actually extracted by factories (as percentage of weight of beets).

7 Preliminary.

Table 153.—Sugar: Production in continental United States, Hawaii, Porto Rico, and the Philippine Islands, 1909-10 to 1930-31

			('ane sugar (chiefly raw)							
Year beginning July	and peer (c	Beet sugar (chiefly refined)	Conti- nental United States	Porto Rico	Hawaii	Philip- pme Islands	Total			
1908-10 1910-11 1911-12 1912-13 1913-14 1914-15 1915-16 1916-17 1917-18 1918-19 1919-20 1920-21 1921-22 1922-23 1923-24 1924-23 1925-26 1927-28 1927-28 1927-28 1927-28 1928-29 1929-28 1929-29	1, 85.9, 658 2, 096, 658 2, 097, 179 2, 304, 2404, 018 2, 282, 021 2, 404, 018 2, 289, 514 2, 781, 304 2, 789, 707 2, 250, 865 2, 014, 278, 97 2, 252, 954 2, 923, 252, 954 2, 923, 252, 954 2, 923, 252, 954 2, 923, 253, 255 2, 924, 925 2, 92	Short tons 512, 469 510, 172 599, 500 692, 556 733, 401 722, 054 874, 220 820, 657 765, 207 760, 950 726, 451 1, 089, 021 1, 020, 489 675, 000 881, 000 1, 980, 000 1, 983, 000 1, 983, 000 1, 081, 000 1, 108, 000 1, 108, 000 1, 1208, 000	Short tons 331, 728 335, 540 335, 540 360, 874 162, 573 300, 538 246, 620 138, 620 138, 620 122, 125 176, 114 327, 701 129, 735 164, 823 83, 483 139, 381 47, 106 70, 792 132, 053 200, 000 184, 000	Short tons 340, 786 349, 340 371, 076 388, 004 381, 686 386, 590 488, 590 453, 794 406, 002 485, 071 488, 818 408, 325 379, 172 447, 670 660, 411 603, 240 629, 187 748, 671 586, 761 866, 110 783, 163	Short tons 517, 990 566, 821 593, 088 546, 524 612, 000 646, 000 592, 763 644, 663 570, 700 680, 312 555, 727 521, 579 592, 000 787, 246 811, 333 896, 918 899, 101 912, 337 2 915, 000	Short tons  2 140, 783 168, 254 268, 878 345, 077 408, 339 421, 192 412, 274 425, 266 474, 745 453, 346 466, 913 589, 437 533, 189 529, 091 607, 362 768, 902 907, 814 933, 954 283, 767 283, 190	Shorttons 1, 336, 385 1, 439, 955 4, 595, 866 1, 452, 178 1, 672, 543 1, 680, 302 1, 627, 247 1, 883, 910 1, 751, 079 1, 744, 960 1, 769, 948 1, 961, 215 1, 687, 232 1, 832, 484 2, 297, 404 2, 137, 239 2, 254, 535 2, 524, 535 2, 524, 201 2, 551, 869 2, 962, 234 2, 865, 263			

Bureau of Agricultural Economics. Production data compiled from the following sources: United States from the Department of Agriculture, except cane sugar, 1909-10 and 1910-11, which are from Willet & Gray; Hawaila from Hawailan Sugar Planters Association; Porto Rico and Philippines from official sources of those islands. Figures for earlier years appear in previous issues of the Yearbook.

Table 154.—Cane sugar: Production of Hawaii, 1913-14 to 1930-31

1		Car	e used for	sugar	Sugar p	roduced	Sugar	Recovery of equiv-	
Year beginning October	Total acreage in cane	Acreage har- vested	Average yield per acro 1	Production	As made	Equiva- lent refined <sup>2</sup>	made per short ton of cane	alent refined sugar from cane ground <sup>3</sup>	
1913-14	246, 332 245, 100 276, 800 239, 900 247, 900 236, 500 229, 000 235, 000 232, 000 241, 000 237, 774 234, 809	Acres 112, 700 113, 200 115, 419 123, 900 119, 800 119, 700 114, 100 114, 100 114, 000 114, 000 1122, 309 124, 542 129, 131, 534 129, 131 133, 840 137, 037	Short tons 43 46 42 41 40 39 41 41 51 52 53 56 59 68	Short tons 4, 900, 000 5, 185, 900 5, 185, 000 4, 855, 000 4, 855, 000 4, 744, 000 4, 473, 000 5, 688, 000 5, 688, 000 6, 297, 000 6, 297, 000 6, 297, 000 6, 297, 000 7, 707, 330 7, 447, 494 7, 883, 485, 183	Short tons 612, 000 646, 000 592, 763 644, 663 576, 700 600, 312 555, 727 592, 000 691, 000 787, 246 811, 333 896, 938 899, 101 912, 387 988, 612	Short tons 573, 000 605, 000 554, 708 603, 276 559, 676 561, 772 520, 049 488, 049 488, 049 564, 000 720, 000 7736, 705 758, 245 839, 386 841, 379 853, 784	Pounds 250 249 244 247 238 248 228 235 244 244 244 242 232 233 241 232 233	Per cent 11. 69 11. 67 11. 156 11. 152 11. 84 11. 63 10. 88 10. 89 11. 03 11. 43 11. 43 11. 43 11. 30 10. 86	

Bureau of Agricultural Economics. Estimates of the crop-reporting board prior to 1926. Since then data collected through the Hawaiian Sugar Planters' Association.

3 Based upon tonnage of cane used.

<sup>&</sup>lt;sup>1</sup> Cane sugar, raw, converted to refined basis by multiplying by the following factors: United States, 0.932; Porto Rico, 0.9393, Hawaii, 0.9358; Philippine Islands, 0.95.

<sup>2</sup> Exports.

<sup>3</sup> Unofficial.

Age of cane equals 18 to 22 months of growth.
 1 ton of sugar as made is assumed to be equivalent to 0.9358 tons of refined, as tentatively recommended by the joint committee on sugar statistics of the Department of Commerce and the Department of Agri-

Table 155.—Cane sugar: Production in Louisiana, 1911-1931

		Cane used for sugar			Sugar produced Re-				Molasses made			
rear oper-	Fac- tories oper- ating	Acreage	Av- er- age yield per acre <sup>2</sup>	Produo- tion	As made	Equiv- alent refined <sup>3</sup>	of equivalent sugar refined sugar from cane ground		Total 5	Per ton of sugar made	Per ton of cane used	
1911	Num- ber 188 126 150 149 136 150 140 134 121 122 105 82 91 54 46 65 61	Acres 310, 000 197, 000 248, 000 213, 000 221, 000 221, 000 182, 200 179, 900 182, 843 220, 366 220, 366 163, 000 128, 000 128, 000 173, 000 115, 000 154, 000 154, 000	Short tons 19.0 11.0 17.0 15.0 18.0 10.5 18.6 18.5 11.1 7.6 18.2 18.8 17.1 15.0	Short tons 5, 887, 292 2, 162, 574 4, 214, 000 2, 018, 000 4, 072, 000 3, 813, 000 4, 170, 000 1, 883, 000 2, 492, 524 4, 180, 780 2, 492, 524 4, 180, 780 2, 492, 500 1, 288, 650 1, 228, 000 2, 645, 000 864, 000 2, 646, 000 2, 599, 000 2, 599, 000 2, 310, 000	\$\frac{\short}{\tons}\$ \$52, 874 \$153, 573 \$292, 698 \$242, 700 \$187, 500 \$303, 900 \$243, 600 \$280, 900 \$121, 000 \$122, 000 \$169, 127 \$24, 431 \$295, 695 \$162, 023 \$8, 000 \$139, 000 \$139, 000 \$132, 000 \$134, 000 \$156, 000	123,000	Per cent 5.59 6.62 6.47 7.07 6.35 6.95 6.59 6.32 7.23 6.33 6.691 6.661 6.37 6.68 6.628	Pounds 120 142 139 152 135 149 128 135 129 136 156 156 156 166 137 144 142 137	Gallons 35, 062, 525 14, 302, 169 24, 046, 320 17, 177, 443 12, 743, 000 30, 728, 000 28, 049, 000 12, 991, 000 16, 856, 867 25, 423, 241 122, 718, 640 15, 719, 400 9, 590, 000 17, 783, 000 6, 614, 000 18, 525, 000 19, 619, 000 16, 887, 000 114, 322, 000	Gal- lons 99 93 82 77 107 107 107 109 128 141 98 92 92	Gal-lons 6.6.7 5.6.34 1.77 9 5 1.06.8.77 5.3.76 6.2 6.6.2 6.6.6.6.6.6.6.6.6.6.6.6.6.6.	

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>&</sup>lt;sup>1</sup> Sugar campaign, usually not ended before February following season of growth of cane.

<sup>2</sup> Age of cane equals one growing season of about 9 months.

<sup>3</sup> I ton of sugar as made is assumed to be equivalent to 0.932 tons of refined as tentatively recommended by the joint committee on sugar statistics of the Department of Commerce and the Department of Agri-

of the four commerce and the Department of Agriculture.

4 Based upon tonnage of cane used.

5 Figures for molasses, 1911–1914, are as reported by the Louisiana Sugar Planters' Association. Figures for later years as reported by Division of Crop and Livestock Estimates. For sirup production see Table 163.

6 Preliminary.

Table 156 .- Sugar: Production in specified countries, average 1909-10 to 1913-14 and 1921-22 to 1925-26, and annual 1928-29 to 1931-32

## BEET SUGAR IN TERMS OF RAW SUGAR

Country	Average, 1909-10 to 1913-141	A verage, 1921-22 to 1925-26	1928-29	1929-30	1930–31	1931–32 3
NORTH AMERICA CanadaUnited States	Short tons 11,782 655,000	Short tons 31, 908 984, 600	Short tons 36,735 1,141,000	Short tons 39, 432 1, 004, 000	Short tons 53, 764 1, 298, 600	Short tons 53,000 1,201,000
Total	666, 782	1, 016, 508	1, 177, 735	1, 133, 432	1, 352, 364	1, 254, 000
EUROPE						
England and Wales Scotland Irish Free State Sweden Denmark Netherlands Belgium France Spain Italy Switzerland Germany Austria Czechoslovakia Hungary Yugoslavia Bulgaria Rumania Poland Latyia Finland Russie, European Turkey	278, 837 115, 727 208, 675 3, 784 2, 340, 268 79, 528 1, 221, 274 175, 783 41, 459 4, 376 88, 245 702, 626	24, 385 (°) (°) (°) (°) (°) (°) (°) (°) (°) (°)	240, 861 1, 836 24, 236 177, 415 176, 014 346, 849 363, 213 999, 249 237, 476 432, 903 432, 903 1, 164, 525 144, 525 140, 600 1, 164, 525 140, 600 1, 164, 525 141, 1797 1, 413, 900 4, 079	132, 706 1, 141, 638 272, 083 143, 769 40, 800 118, 150 1, 009, 597 3, 888 2, 790 907, 000	318, 449 474, 904 6, 300 2, 808, 076 165, 620 1, 258, 614 258, 127 113, 198 60, 205 181, 009 854, 957 8, 322 4, 267	176, 000 874, 021 171, 000 92, 104 24, 600 70, 000 644, 258 10, 747
* Total	8, 155, 838	6, 140, 665	9, 107, 786	8, 949, 751	11, 318, 905	8, 689, 20
Japan:  Hokkaido Chosen		9, 995 625	22, 724 709	733	1,007	30, 00 1, 00
Total		10, 620	23, 433	28, 797	33, 341	31, 00
OCEANIA Australia	1,030	3, 021	2, 348	3, 186	3,752	2, 20
World total, beet sugar 7	8, 823, 650	7, 170, 814	10, 311, 302	10, 115, 166	12, 708, 362	9, 978, 40
CA	NE SUG	AR (RAV	57)			
NORTH AMERICA, CENTRAL AMERICA, AND WEST INDIES						
United States	302.150	203, 224	132,053	199, 609	183, 693	155.92

AND WEST INDIES						
United States	302, 150 567, 495 361, 974 5, 482	203, 224 675, 249 499, 751 5, 535	586, 761	199, 609 912, 357 866, 110 6, 424	783, 163	8 915, 300 948, 942
Central America: Guatemala	8, 998	21, 733	•	8 87, 408		
Nicaragua	3, 742 10, 834	14, 457 21, 200	3 10, 000 23, 148	16, 000 27, 600		
Mexico	163, 388	179, 150	201, 831	<sup>8</sup> 235, 000	289, 591	<sup>8</sup> 224, 000

st Indies (Brissia);
Antigus.
Barbados.
Jamaica.
St. Christopher.
Trinidad and Tobago. I Averages are for a 5-year period wherever available, otherwise for any year or years within this period.
Figures for Europe are estimates of production in territory within present boundaries.
Preliminary.
Unofficial estimate.
No sugar produced.
Too small to report.
Included with cane-sugar production in Japan.
Exclusive of production in minor producing countries for which no statistics are available.

<sup>8</sup> 12, 258 73, 378 64, 549

38, 192 62, 272

12, 919 27, 788 23, 856

Table 156.—Sugar: Production in specified countries, average 1909-10 to 1913-14 and 1921-22 to 1925-26, and annual 1928-29 to 1931-32-Continued

## CANE SUGAR (RAW)-Continued

Country	Average, 1909–10 to 1913–14	Average, 1921-22 to 1925-26	1928-29	1929-30	1930-31	1931-32
NORTH AMERICA, (ENTRAL AMERICA, AND WEST INDIES—continued  Cuba Dominican Republic Haiti West Indies (French):	Short tons 2, 287, 052 104, 664 (5)	Short tons 4, 908, 638 281, 846 10, 158	398, 575	Short tons 5, 231, 490 403, 638 è 21, 176	Short tons 3, 495, 292 406, 237 3 21, 068	Short tons 3 3,360, 000 424, 850 8 20, 000
GuadeloupeMartinique.	40, 810 42, 782	32, 674 33, 573	<sup>3</sup> 2, 590 <sup>3</sup> 42, 056	<sup>3</sup> 30, 144 <sup>3</sup> 42, 038	<sup>3</sup> 27, 328 <sup>3</sup> 41, 328	<sup>8</sup> 31, 000 <sup>8</sup> 44, 000
Total North American and Central American countries and West In- dies reporting, all years	4, 013, 885	7, 041, 422	8, 352, 692	8, 247, 164	6, 441, 581	6, 418, 217
EUROPE AND ASIA						
Spain India <sup>5</sup> Formosa Japan Java <sup>9</sup> Philippine Islands	I 102 20 <b>0</b>	2, 113, 004	3, 197, 927	106, 986 3, 245, 288	867, 561 161, 723	31, 400 3,472,000 996, 579 3 206, 102 3 2,688,000
Total European and Asiatic countries reporting, all years	4, 447, 125	5, 932, 859	7, 228, 485	7, 358, 677	7, 800, 084	7, 394, 081
SOUTH AMERICA						
Argentina Brazil British Guiana Dutch Guiana Ecuador Peru Venezoula	332, 813 112, 297	904, 456 112, 297 12, 469 17, 603 354, 567	1, 066, 301 130, 462 19, 883 25, 370 398, 741	131, 324 14, 069 8 21, 008 472, 176	1, 008, 000 143, 096 3 18, 500 23, 208 3 543, 286	\$ 1,092,000 \$ 123,000 \$ 16,000 \$ 22,400 \$ 576,000
Total South America	864, 192	1, 710, 823	2, 075, 704	2, 163, 258	2, 178, 944	2, 230, 524
AFRICA						
Egypt Marritius Union of South Alirea Portuguese East Africa Rennion Madagascar	67, 127 233, 671 88, 166 26, 460 41, 653	03, 218	279, 360 295, 934 100, 786 42, 211	00, 293	00,012	3 39, 000
Total Africa.	457, 076	633, 158	845, 211	845, 673	928, 120	775, 136
OCEANIA	216, 331	411, 635	602, 083	602 654	600, 992	3 670, 000
Australia Fiji	84, 620		3 110, 520		104,000	\$ 80,000
Total Oceania	300, 960	483, 623	712,60	700, 890	704, 992	789, 000
Total cane-sugar producing countries reporting all years. Estimated world total cane sugar 7. Total world cane and beet sugar production in countries reporting all	10, 083, 238 10, 539, 000		19, 214, 700 20, 365, 000		l	
years Estimated world total cane and beet sugar ?	, ,		5 29, 526, 002 30, 676, 000	1	1	
	<u> </u>			<del></del>		

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture except as otherwise stated. Figures are for the crop years 1900-10 to 1931-92 for the countries in which the sugar-harvesting season begins in the fall months and is completed during the following calendar year, except in certain cane-sugar producing countries in the Southern Hemisphere, such as Argantina, Australia, Mauritus, Union of South Africa, etc., where the season begins in May or June and is completed in the same calendar year. Production in these countries is for the calendar years 1909 to 1931.

<sup>&</sup>lt;sup>8</sup> Unofficial estimate.

No sugar produced. Too small to report.

<sup>° 100</sup> Small to report.
? Exclusive of production in minor producing countries for which no statistics are available.
? Exclusive of production in minor production of gur, a low grade of sugar polarizing between 50° and 60°. Practically the entire crop is consumed within the country.
° All grades of sugar reduced to terms of head sugar, a grade of sugar which contains at least 96.5 per cent of sucrose. Figures for Java are for the calendar years 1910 to 1932.

Table 157 .- Sugar: Production, trade, and supply available for consumption in continental United States, 1909-10 to 1931-32

## IN TERMS OF RAW SUGAR

	Produc-	Brought in from insu-	Imports as	Domestic	Exports in other	A vailable sumption	
Year beginning July	tion 1	lar posses- sions <sup>3</sup>	sugar 3	exports as sugar 4	forms 5	Total	Per capita
1909-10 1910-11 1911-12 1912-13 1912-13 1913-14 1914-15 1915-16 1916-17 1917-18 1918-19 1919-20 1920-21 1920-21 1921-22 1922-23 1922-24 1922-25 1925-26 1926-27 1927-28 1928-29 1927-28	1, 022, 828 1, 078, 407 1, 198, 107 1, 088, 437 1, 102, 421 903, 060 1, 346, 811 1, 424, 726 1, 101, 360 1, 111, 898 1, 280, 000 1, 121, 000 1, 121, 000 1, 246, 000 1, 273, 000	Short tons 927, 752 943, 701 1, 187, 663 1, 026, 972 936, 376 1, 098, 314 1, 102, 057 1, 203, 938 975, 634 1, 975, 735 1, 976, 342 1, 340, 867 1, 235, 049 1, 274, 819 1, 981, 482 1, 981, 482 1, 981, 482 2, 051, 659 1, 974, 899 2, 377, 787	\$\text{Sh}\ ort \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	%hort tons 72, 382 36, 597 50, 380 30, 963 37, 190 302, 641 882, 864 676, 752 305, 429 568, 566 776, 502 319, 589 1, 085, 349 412, 183 273, 470 325, 804 124, 555 115, 566 189, 324 87, 092	Short tons 24, 351 15, 966 15, 160 19, 217 11, 892 13, 385 12, 213 29, 211 46, 181 36, 747 98, 386 89, 491 31, 397 12, 508 24, 603 24, 603 24, 603 24, 603 25, 833 31, 894 44, 320	Short tone 3, 648, 403 3, 639, 891 3, 959, 883 4, 150, 288 4, 439, 489 4, 334, 489 4, 219, 066 4, 037, 377 4, 219, 066 4, 037, 377 5, 589, 624 5, 542, 352 5, 549, 624 5, 647, 627 6, 647, 627 6, 508, 090 7, 192, 282 6, 364, 548	Pounds 79. 7 78. 3 83. 9 86. 6 91. 3 87. 9 79. 4 83. 2 78. 5 83. 8 91. 1 97. 6 100. 2 114. 2 114. 4 110. 1 119. 0 103. 1
1930-31 1931-32		2, 603, 733	2, 416, 400	77, 131	33, 026	6, 391, 976	103.0

### IN TERMS OF REFINED SUGAR ?

1922-23     956       1923-24     1, 034       1924-25     1, 172       1926-26     1, 043       1926-27     941       1927-28     1, 156       1928-29     1, 184       1929-30     1, 204       1930-31     1, 376	0, 625	.686, 397 1, 009, 377 .805, 745 383, 439 .214, 883 142, 217 .674, 563 254, 311 .634, 323 303, 073 .714, 064 115, 865 .706, 443 107, 704 .851, 311 129, 846 .641, 709 81, 167 .261, 189 71, 884	29, 182 5, 234, 638 11, 682 5, 522, 600 22, 943 6, 283, 115 20, 911 6, 118, 848 23, 298 6, 210, 284 24, 514 6, 103, 656 27, 805 6, 150, 666 29, 726 6, 734, 070 40, 375 5, 963, 307 30, 781 5, 989, 133	99. 7 93. 7 106. 8 106. 8 103. 6 103. 1 111. 4 96. 8
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Bureau of Agricultural Economics. Trade figures from the Bureau of Foreign and Domestic Commerce.

0.932.

<sup>&</sup>lt;sup>1</sup> Beet and cane sugar only.
<sup>2</sup> Duty free, from Hawaii, Porto Rico, and the Philippine Islands (Virgin Islands included 1917 and subsequently).

No account taken of sugar imported in other forms. Imports from the Philippine Islands excluded, reexports deducted

<sup>&</sup>lt;sup>4</sup> Shipments to Hawaii and Porto Rico included. Direct exports to foreign countries from Hawaii and Port Rico excluded.

Sugar used in the manufacture of other commodities for export on which drawback was paid.
 No account taken of stocks at the beginning or end of year.
 Raw sugar converted to refined by multiplying by the following factors: Cuba and Hawaii, 0.9358;
 Porto Rico, 0.9393; Philippines, 0.95; all others (Santo Domingo, British West Indies, Louisiana, etc.),

Table 158.—Sugar, raw, cane and beet: World production, 1909-10 to 1931-32

	Esti-	Esti- mated	Esti- mated			Product	tion in se	lected o	ountries		
Crop year <sup>1</sup>	mated world total	world total cane sugar	world total beet sugar	United States	Cuba	India s	Java 4	Ger- many	Czecho- slovakia	Po- land 6	France 7
1909-10 1910-11 1911-12 1912-13 1913-14 1915-16 1916-17 1917-18 1918-19 1919-20 1920-21 1921-22 1922-23 1923-24 1924-25 1925-26 1926-27 1928-29 1928-29 1928-29 1928-29 1928-29 1928-29 1928-29 1928-29 1928-29 1929-30 1930-31	1, 000 short tons 16, 828 18, 834 17, 908 20, 542 21, 154 20, 875 18, 885 19, 593 18, 604 17, 989 19, 546 20, 578 20, 860 22, 810 26, 670 27, 989 26, 624 28, 515 30, 676 30, 676 30, 676 31, 961 28, 735	1,000 short tons 9,670 9,870 10,896 11,952 12,278 13,255 14,790 14,076 14,338 14,225 15,096 16,127 16,306 17,712 18,813 18,125 10,000 11,952 1	1,000 short lons 7,158 8,964 7,286 9,646 9,514 8,923 6,607 5,357 5,503 4,528 3,521 5,483 9,176 8,993 9,176 8,499 10,115 10,115 10,115 9,976	1,000 short tons 893 903 1,005 1,029 1,023 1,078 1,193 1,068 1,102 1,102 1,120 1,120 1,120 1,120 1,120 1,120 1,120 1,135 1,246 1,248 1,248 1,248 1,248 1,357	1,000 short tons 2,021 1,661 2,124 2,720 2,922 3,398 3,422 3,398 4,491 4,406 4,517 5,524 5,552 5,554 5,552 5,338 18,495 5,552 5,338 18,495 5,552 5,338 18,495 5,538 18,495		1,000 short fons 1,411 1,617 1,550 1,540 1,454 1,797 2,009 1,473 1,853 1,984 1,853 2,201 2,535 2,175 2,638 3,148 10 2,688	1,000 short tons 2,147 2,770 1,552 2,990 2,886 1,721 1,678 1,720 1,297 1,195 1,484 1,763 1,763 1,763 1,763 1,763 1,846 2,188 2,188 2,808	1,000 short tons	376 239 293 293 293 249 106 195 170 335 423 540 638 638 638 644 1,010	1,000 short tons 861 763 546 1,029 841 855 159 217 235 129 182 358 326 522 522 524 919 919 911 1,011 1,324 980

Bureau of Agricultural Economics. Estimated world total sugar production for the period 1895-96 to 1908-09 in Agricultural Yearbook, 1924, p. 808.

Figures for 1909-10 to 1918-19 refer to pre-war boundaries; 1914-15 to 1918-19 are exclusively of invaded territory.

8 Bohemia, Moravia, and Silesia only.

9 Preliminary. 10 Unofficial estimate.

Table 159.—Sugar, raw (96° centrifugal): Average wholesale price per pound, New York, 1922-1931 1

Year	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver-
1932 1923 1924 1925 1926 1927 1928 1929 1930	Cents 3.6 5.3 6.7 4.6 4.2 5.1 4.5 3.8 3.7	Cents 3.8 6.2 7.2 4.6 4.2 4.9 4.3 3.7 3.3	Cents 3.9 7.3 6.9 4.7 4.0 4.8 4.5 3.7 3.6	Cents 4.0 7.8 6.4 4.5 4.1 4.8 4.5 3.7 3.5	Cents 4.1 7.9 5.6 4.3 4.2 4.8 5.6 3.6 3.2	Cents 4.6 7.4 5.1 4.4 4.1 4.6 4.3 3.5 3.2 3.3	Cents 5.2 6.9 5.1 4.3 4.5 4.5 3.8 3.5	Cents 5. 2 6. 1 5. 4 4. 4 4. 2 4. 5 4. 1 3. 8 3. 2	Cents 4.8 7.0 6.0 4.3 4.4 4.2 4.0 3.1	Cenis 5.4 7.6 6.0 3.9 4.6 4.7 3.9 4.0 3.3 3.4	Cenis 5.6 7.3 5.8 4.0 4.7 4.7 3.9 3.8 3.4	Cents 5.7 7.3 5.3 4.1 5.1 4.6 3.9 3.8 3.3 3.2	Cents 4.7 7.0 6.0 4.3 4.3 4.7 4.2 3.8 3.4

Bureau of Agricultural Economics. Compiled from Bureau of Labor Statistics reports. Data for 1890-1921 are available in 1924 Yearbook, p. 810, Table 388.

<sup>1</sup> Figures are for the crop years 1909-10 to 1930-31 for the countries in which the sugar production season begins in the fall months and is completed during the following calendar year, except in certain cane-sugar production in these countries is for the calendar years 1909 to 1930.

3 Production in these countries is for the calendar years 1909 to 1930.

3 Production of cane and beet sugar in terms of raw sugar.

3 The figures quoted for India are for the production of gur, a low grade of sugar polarizing between 50° and 60°. Practically the entire crop is consumed within the country.

4 All grades of sugar reduced to terms of head sugar, a grade of sugar which contains at least 96.5 per cent sucrose. Figures for Java are for the calendar years 1910-1932.

5 Figures for 1909-01 to 1917-18 are for pre-war boundaries.

6 Figures are incomplete through 1920-21; 1914-15 includes Prussian Poland only; 1915-16 to 1919-20 include Prussian Poland and Congress Poland, and Galicia.

Quotations are on basis of duty paid.
 Derived from the figures upon which the monthly averages are based.

Table 160.—Sugar: International trade, average 1925-1929, annual 1927-1930

				Calend	ar year			
Country	Average,	1925–1929	19	28	10	29	19	30 1
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES		M	OT auddens	Ch and dama	Ch auddono	Chauttone	C'h outdou o	C/2 and do
Cuba	Short tons 5, 048, 092	525	Short tons 4, 389, 253	Short tons 135	Short tons 5, 543, 887	Shorttons 79	3, 642, 624	Short tons
Dutch East Indies	2, 380, 762 792, 566	3, 634	2, 827, 302	3,772	2, 680, 686	3, 825 109	22,468,929	2 335
Czechoslovakia Philippine Islands	792, 560 612, 260	628 2, 398	819, 545 628, 242	77 4,887	595, 686 767, 055	2, 138	571, 962 820, 089 386, 621	3, 332 1, 046
Philippine Islands Dominican Republic		196	383, 661 337, 270	17 24	J 300, 074	7 107	386, 621	979 441
Dominican Republic. Peru. Poland. Mauritius. Australia <sup>8</sup> Germany Belgium British Gulana. Russia	332, 668 253, 202	106 2, 291	204,675	38	400, 553 328, 309	11, 087	435, 378	373, 441 11, 977
Mauritius	242, 199	1 3 911	241, 695	3 g 33	306, 259	8 2 27		
Germany	179, 533 174, 357	92, 758	232, 667 85, 161	138, 113 86, 349	242, 455	30, 826 88, 820	328, 458	18, 876
Belgium	152. 463	92, 758 77, 894 447	85, 161 109, 906 128, 449	86, 349 536	128, 509	88, 820 361	328, 458 79, 012 128, 287	74, 707 192
Russia	113, 607 105, 024	57, 858	150, 348	9		40, 086		2/19 1KK
Fiji	92, 836	171 417	135, 165 78, 013	172 594	80, 948 133, 851	290 862	101, 896 117, 780 183, 482 77, 435	193 722
Union of South Africa.	90, 488 82, 951	10, 307	90, 389	17, 977	133, 851 122, 740 91, 284	19, 867	183, 482	10, 126
Trinidad and Tobago	72, 520 61, 494	1, 564	83, 006 70, 178	2, 056 0	91, 284 73, 379	1, 607 0	77, 435 56, 497	1, 010 0
Reunion	54, 035	26	* 39, 516	8 132	3 41, 447	* 0		
Jamaica	49, 676 37, 906	1, 081 93	54, 562 40, 060	1, 102 377	41, 866 55, 299	1, 373 14		
Brazil	25, 076	20	33, 116 37, 775	3	16, 400 10, 034	0	93, 097	• 4
Hungary Union of South Africa. Trinidad and Tobago Barbados Reunion Jamaica. Mozambique. Brazil. Argentina. Madagascar	23, 426 3, 897	17, 264 3, 768	37, 775 4, 659	1, 246 3, 960	10, 034 5, 500	1, 979 4, 237	93, 097 4, 699 4, 784	5, 083 3, 618
Total			11, 204, 616	261, 605	12, 490, 337	207, 703	9, 501, 030	846, 950
PRINCIPAL IMPORTING								
United States	167, 360 105, 263	4, 428, 566	122, 587	3, 868, 804	102, 639 186, 766	4, 888, 389	77, 814	3, 495, 113 2, 136, 360
British India	105, 263 40, 084	2, 146, 493 904, 568	83, 825 44, 761	2, 150, 189 930, 251	186, 766 42, 962	2, 351, 404 1, 034, 939	312, 589 48, 487	1 014 270
China	2, 072 89, 914	823, 225	1, 542 27, 555 282, 929	916, 132 477, 711	665	1, 034, 939 959, 428 475, 490	252	812, 404 472, 706 452, 644
France	251, 691	524, 446 400, 753	27, 000 282, 929	488, 067	20, 799 331, 458	562, 430	13, 906 308, 767 244, 568	472, 706 452, 644
Japan	204, 509	414, 134	200, 00%	423, 395	331, 458 217, 615	251, 020	244, 568	209, 693
Switzerland	284, 204 74	414, 134 316, 951 148, 736 136, 205	227, 232 85	307, 109 158, 532	122, 542 97	188, 931 163, 479	106, 270 188	198, 641 166, 365
Chile	133	136, 205	200	149, 113	159	168, 181 128, 229		125, 938
Morocco.	31, 068 0	125, 180 121, 576	32, 135 0	125, 176 128, 314	21, 297 0	128, 229	15, 585 0	128, 473 142, 492
Austria	663 18	114, 983	617	118, 737	685	123, 377	558	89.632
Irish Free State	10	110, 608 92, 080	18 0	103, 528 90, 115	55 0	159, 566 88, 518	90 0	91, 037 92, 108
Finland	0 102	87, 238 86, 255	0	101, 485	.0	101, 349	Ŏ	134, 417
Austria Sweden Irish Free State Finland Portugal Persia New Zealand Novwer	99	82, 505	105 9	94, 066 84, 399	80 8	100.175		
New Zealand	739 0	81, 102 79, 493	867 0	89, 497	1,062	78, 665 83, 705 107, 974	1, 222	96, 579
Egypt	9, 341	79, 282	5, 704	80, 109 77, 881	7, 256	107, 974	5. 146	93, 011 143, 326
Greece	6, 616 5 12	68, 519 64, 751	23	119, 438 67, 075	7, 256 9, 192	23, 499 69, 765	5, 146 14, 361	143, 326 20, 700
Algeria	65	63, 358	8 21	70, 785	8 68	75, 502		70, 499 81, 298
Siam 6	1,648	61, 046 46, 472	0 243	69, 030 44, 164	3 1 39	72, 242		80, 102
Latvia	20	41, 655	2.0	46, 559	70			52, 873 45, 874
Denmark.	0 3, 148	41, 575 29, 841	0 605	37, 338 43, 603	. 0	41, 103		
Tunis	0, 140	29, 841 29, 742	. 0	31,841	1 0	37, 478	183	50, 315 41, 334
Naw Zealand Norway Egypt Greece Algeria Ceylon Siam 6 Latvia Lurugay Denmark Tunis Lithuania Anglo-Egyptian Sudan Formosa Yugoslavia Gold Oost	9	25, 731	* 28	27, 501	³ 18	29, 796		41, 384 34, 418
Sudan	. 0	23, 812	0	26, 766	0	32, 976	0	34, 442
Yngoslavia	13, 346 4, 654	18, 109 7, 320	8,744 0	8, 374 16, 108 6, 704	2.987	1,642	8, 858	
		., 020	, ,	100	1 72 000	0,102	, ರಾಧರಿಶ	2,072
Gold Coast	0	5, 584	0	6,704	0	5, 994		

Bureau of Agricultural Economics. Official sources except where otherwise noted. The following kinds and grades have been included under the head of sugar; Brown, white, candied, caramel, chancaca (Peru), crystal cube, maple, muscovado, panela. The following have been excluded: "Candy" (meaning confectionery), confectionery, glucose, grape sugar, jaggery, molasses, and sirups.

Preliminary.
 Java and Madura only.
 International Yearbook of Agricultural Statistics.

<sup>4</sup> Year ended Mar. 20 of following year.

 <sup>2-</sup>year average.
 Year ended Mar. 31 of following year.

Table 161.—Sugar, granulated: Average retail price per pound, United States, 1922-1931

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	Мау 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec.	Aver- age
1922 1923 1924 1925 1926 1927 1928 1929 1930 1930	Cents 6.2 8.3 10.2 8.1 6.7 7.5 7.1 6.7 6.6 5.9	Cents 6.4 8.7 10.3 7.7 6.7 7.5 7.1 6.6 6.5 5.9	Cents 6. 5 10. 2 10. 4 7. 7 6. 7 7. 1 6. 5 6. 4 5. 8	Cents 6.7 10.6 9.9 7.5 6.6 7.3 7.1 6.4 6.3 5.7	Cents 6.6 11.2 9.2 7.2 6.7 7.3 7.2 6.4 6.3 5.6	Cents 7.1 11.1 8.3 7.2 6.9 7.3 7.3 6.4 6.1 5.6	Cents 7.6 10.5 8.4 7.1 6.9 7.3 6.4 5.6	Cents 8.1 9.6 8.2 7.0 7.3 7.1 6.6 6.1 5.7	Cents 7. 9 9. 6 8. 6 7. 0 7. 0 7. 2 7. 0 6. 7 5. 9 5. 7	Cents 7.9 10.6 8.8 6.8 7.1 7.2 6.9 6.7 5.8 5.6	Cents 8.1 10.3 8.8 6.6 7.1 7.2 6.8 6.7 5.9 5.6	Cents 8.3 10.4 8.8 6.7 7.3 7.1 6.6 5.9 5.5	Cents 7.3 10.1 9.2 7.2 6.9 7.3 7.1 6.6 6.2 5.7

Bureau of Agricultural Economics. Compiled from Bureau of Labor Statistics retail prices. Data for 1913-1921 available in 1930 Yearbook, p. 704, Table 162.

Table 162.—Sorgo sirup: Acreage, production, and December 1 price, by States, 1928-1931

State	Acreage used for sirup			Αv	orago ac		per	Production				Price per gallon received by pro- ducers				
	1928	1929	1930	1931 1	1928	1929	1930	1931	1928	1929	1930	1931 1	1928	1929	1830	1931
Indiana Illinois Iowa Missouri Kansas Virginia North Carolina South Carolina Georgia Kentucky Tennessee Alabama Mississippi Arkansas Oklahoma Texas	1,000 acres 9 3 222 22 122 18 24 422 29 30 30 40 15	2 3 9 1 2 15 5 11 12 19 22 27 12 14	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 2 1 2 1	acres 3 2 3 12 4 3 20 9 16 18 25 25 25 20 10	Gals. 96 72 120 85 75 86 86 72 80 72 78 80 77 75 77 70	55 60 61 70 72 65 55 60 63 81 46	47 51 100 45 40 60 50 24 45 58 88 88 25	65 72 90 55 50 70 73 54 61 70 65 75 88 87 45 60	gals. 192 648 360 1,870 1,032 1,720 1,296 1,920 2,262 2,400 2,800 1,050 2,656	130 333 495 60 122 1,050 715 600 1,140 1,386 1,386 1,365 144 700	gals. 94 102 200 450 80 1, 320 744 480 864 2, 015 952 456 25 704	195 144 270 660 200 210 2, 117 486 976 1, 260 1, 820 4, 050 2, 200 1, 400 4, 50 1, 380	110 115 100 100 95 90 80 95 95 95 95 80 80	110 115 105 95 95 85 80 90 100 95 85 85 85	110 115 100 100 95 80 75 70 90 90 85 85 73	62 71 67 53 48 43 49 40 32 30 40 45
United States.	330	150	165	259	77.7	61.7	54, 0	68.8	25, 630	9, 256	8, 916	17, 818	90.4	89.7	78. 7	43. 0

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

Table 163.—Sugarcane sirup: Acreage, production, and December 1 price, by States, 1928-1931

Stato	Ac	Acreage used for sirup			Λv		y ield re	per		Produ	iction		Price per gallon received by pro- ducers			
	1928	1929	1930	1931 1	1028	1929	1930	1931	1928	1929	1920	1931 ¹	1928	1929	1930	1931
South Carolina Georgia Florida Alabama Mississippi Arkansas Louistana Teras United States	1,000 acres 6 29 8 16 18 2 20 11	acres 5 29 10 18 17 1 17 7	acres 5 28 9 18 15 1 222 6	28 9 20 14 1 20 7	125 140 180 117 200 120 334 160	118 165 186 117 191 106 340 124	118 130 170 120 120 54 282 142	80 100 165 93 150 140 252 147	750 4,060 1,440 1,872 3,600 240 6,679 1,760	4, 785 1, 860 2, 106 3, 247 106 5, 773	1, 530 2, 160 1, 800 54 6, 208 852	2,800 1,485 1,860 2,100 140 5,045 1,029	75 85 95 90 110 55 110	90 75 85 90 85 110 46 105	80 65 80 70 100 86 95	50 50 55 55 69 39

Bureau of Agricultural Economics. Estimates of the crop-reporting heard.

<sup>1</sup> Preliminary.

<sup>1</sup> Proliminary.

Table 164.—Maple sugar and sirup: Production in important States, 1917-1931 1

				Total		e total per tree	Average ceived by	price re- producers
Year	Trees tapped	Sugar made	Sirup made	product in terms of sugar <sup>2</sup>	As sugar 2	As sirup ²	Per pound of sugar	Per gallon of sirup
1917	1,000 trees 17, 313 19, 132 18, 799 18, 895 15, 114 16, 274 15, 291 15, 407 16, 313 14, 712 14, 603 14, 388 12, 906 13, 113 12, 218	1,000 pounds 10,525 12,944 9,787 7,324 4,730 5,147 4,685 4,078 3,236 3,589 3,133 2,317 1,344 1,663	1,000 gallons 4,253 4,863 3,804 3,580 2,388 3,640 3,605 3,737 3,677 3,677 3,677 2,346 3,635 2,157	1,000 pounds 44,589 51,848 40,219 35,964 23,818 34,267 33,525 35,302 27,946 33,465 32,501 26,373 20,112 31,510 18,909	Pounds 2. 58 2. 71 2. 14 1. 90 1. 58 2. 11 2. 19 2. 29 1. 82 2. 27 2. 23 1. 83 1. 56 2. 40 1. 55	Gallons 0. 32 - 34 - 27 - 24 - 20 - 26 - 27 - 29 - 22 - 23 - 28 - 23 - 19 - 30 - 19	Cents	Dollars

Bureau of Agricultural Economics.

Table 165.—Maple sugar and sirup: Production by States, 1928-1931

	,	Trees t	bəqqa		Sugar made				Sirup made			
State	1928	1929	1930	1931 1	1928	1929	1930	1931 1	1928	1929	1930	1931 1
Maine New Hampshire Vermont Massachusetts New York Pennsylvania Ohio Michigan Wisconsin	1,000 trees 304 5,722 280 3,647 607 1,583 869 570	378 5, 535 268 3, 613 913 1, 208 493	268 3, 682 905 1, 214 503	390 5, 194 252 3, 229 848 1, 256 508	274 1, 133 134 549 67 58	690 37 298 105 39 34	154 1, 195 110 613 212	9 78 830 34 324 190	38 137 1,038 67 718 157 480 208	88 1, 090 44 613 133 205 79	38 93 1, 368 80 1, 120 350 368 146	26 56 578 43 577 202 440
9 States	<u> </u>		<b></b>	12, 218								

Bureau of Agricultural Economics.

<sup>&</sup>lt;sup>1</sup>The data for 1917-1923 include 11 States: Maine, New Hampshire, Vermont, Massachusetts, Connecticut, New York, Pennsylvania, Ohio, Indiana, Michigan, and Wisconsin; data for 10 States, excluding Connecticut, are shown for 1924 and 1925; and data from 9 States, excluding Indiana, are shown from 1926 to 1931. In 1919 the 9 States now included produced about 97 per cent of the maple sugar and about 92 per cent of the maple sirup, as reported by the Bureau of the Census.

§ 1 gallon of sirup taken as equivalent to 8 pounds of sugar.

§ Preliminary.

<sup>&</sup>lt;sup>1</sup> Preliminary.

Table 166.—Honey: Monthly average price in producing sections and at consuming markets, 1921-1930

## EXTRACTED HONEY, PER POUND

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
CALIFORNIA WHITE TO WATER WHITE ORANGE												
F. o. b. southern California shipping points: 1 1927	10 934 1234 714	Cents 734 10 934 1214 718	10 9½ 13½ 7¼	Cents 834 914 914 1014 638	Cents 8 834 10 814 61/2	81/4 83/4 101/4 8 61/4	8%4 9 11 71/2 6)/4	Cents 9 91/1 111/4 71/2 63/8	91.4 91.4 11 71.4	Cents 91/2 91/2 11 71/2 61/2	914 914 12 714	Cents 10 9½ 734 6½
1927 1928 1929 1930 1931	121/4 121/4 131/4 113/4	121/2 121/2 131/2 111/2	11 1216 1316 1114	1216 1316 11	11 121/ 121/ 121/ 11	1114 1214 1214 1214 1214 1014	111/2 121/2 121/2 121/2 101/2	123 121 123 123 123 101	13 1234 13 1254 11	12% 13 1314 1214 11	1984	13 121/5 131/2 12 103/6
INTERMOUNTAIN WHITE TO WATER WHITE SWEET CLOVER AND AL- FALFA												
F. o. b. intermountain points: <sup>3</sup> 1927	634 714 714 714 714 514	61/2 71/3 71/3 71/3 51/4	6 734 734 7 7 534	5% 714 78 67 67 51	514 714 714 614 418	6 7 734 534 458	6 714 7 614 51 5	634 7 734 612 514	7 714 714 534 514	714 714 715 514	73/4 7 71/4 53/6 51/8	71/4 7 71/8 53/4 41/8
WHITE CLOVER												
F. o. b. New York and North Central States: 4 1927. 1928. 1929. 1930.	1014 814 834 834 814 736	10 81/4 83/4 81/4 67/8	91-2 8 9 81-4 63-4	914 8 914 84 64	914 8 8 8 8 8	834 81/2 9 73/4 67/8	814 914 914 71 614	9 9 834 8	73.2	814 814 814 714	834 9 814 736 636	814 814 814 714 638
NORTHEASTERN BUCK- WHEAT												
F. o. b. New York and Pennsylvania points: 4 1927 1928 1929 1930 1931	814 714 714 714 714	7 714 714 614 534	734 734 7 634 538	634 734 736 534	814 714	7½ 7	514	8 8 814 8	714 784 774 614	714 714 8 614 5	71/2 71/2 75/4 51/4 5	73.6 73.4 73.4 6 5
	C	омв	HON	EY, 2	-SEC	TION	CASI	ES		···		
WHITE CLOVER COMB, NO. 1 AND FANCY					1							
F. 0. b. New York and North Central States: 4 1927. 1928. 1929. 1930. 1931.	Dolls. 4. 50 4. 80 4. 25 3. 80	Dolls. 5. 25 4. 80 4. 50 4. 00 3. 75	Dolls. 5. 25 4. 50 4. 25 4. 00 3. 60	Dolls. 5. 25 4. 80 4. 25 4. 00 3. 40	Dolls. 4. 50 4. 50 4. 25 3. 25	Dolls. 5. 00 4. 25 4. 25 4. 00 3. 50	Dolls. 5. 00 4. 50 4. 50 4. 00 3. 50	Dolls. 4.75 4.50 4.50 4.25 3.60	Dolls. 4. 25 4. 50 4. 25 4. 25 4. 25 3. 75	Dolls. 4.75 4.50 4.00 4.00 3.50	Dolls. 4. 50 4. 80 4. 00 4. 00 8. 50	Dolls. 4.80 4.50 4.00 3.75 3.40

Bureau of Agricultural Economics.

Price to beekeepers or other shippers in car lots to July, 1923; thereafter, price in large lots, mostly less than car lots.
 Sales by original receivers to bottlers, confectioners, bakers, and jobbers.
 Price to beekeepers and other shippers, in car lots.
 Price to beekeepers in large lots mostly less than car lots.

Table 167.—Tobacco, unmanufactured: Acreage, production, value, exports, etc., United States, 1890-1931

Year	Acreage	Average yield per acre	Produc- tion	Price per pound re- ceived by pro- ducers Dec. 1	Farm value, basis Dec. 1, farm price	Domestic exports, year be- glining July <sup>1</sup>	Imports, year be- ginning July <sup>1</sup>	Net exports, year beginning July 13
1890	633, 950 594, 749 3 945, 604 3 933, 868	Lbs. 722.8 747.4 687.6 687.1 777.4 775.4 677.6 646.0 748.0	1,000 lbs. 518,683 551,777 495,209 483,024 406,678 491,544 403,004 610,860 698,533	Cts. 8.3 8.5 9.3 8.1 6.8 7.2 6.0	1,000 dolls. 42,846 47,074 46,044 89,155 27,761 35,574 24,258	1,000 lbs. 249, 233 255, 432 266, 083 290, 085 300, 992 295, 539 314, 932 263, 020 283, 613	1,000 lbs. 23, 255 21, 989 28, 110 19, 663 26, 668 32, 925 13, 805 10, 477 14, 036	1,000 lbs. 227, 254 234, 587 239, 153 272, 983 276, 223 266, 317 302, 847 254, 907 271, 559
1889 1899 1900 1901 1901 1902 1903 1904 1905 1906 1907 1907	806, 409 776, 112 796, 099 820, 800 875, 425	788. 1 728. 5 778. 2 788. 0 797. 3 786. 3 819. 0 815. 6 857. 2 850. 5	868, 119 802, 397 814, 345 818, 953 821, 824 815, 972 660, 461 633, 034 682, 429 698, 126 718, 061	7.1 6.6 7.1 7.0 6.8 8.1 8.5 10.0 10.2 10.3	57, 273 53, 661 58, 283 57, 564 55, 515 53, 383 53, 519 68, 233 71, 411 74, 130	344, 656 315, 788 301, 007 368, 184 311, 972 334, 302 312, 227 340, 743 330, 813 287, 901	19, 620 26, 851 29, 429 34, 017 31, 163 33, 288 41, 126 40, 899 35, 005 43, 123	326, 939 290, 915 273, 770 337, 902 286, 335 304, 694 273, 912 302, 506 297, 657 247, 155
1909 1909 1910 1911 1911 1912 1913 1914 1915 1916 1917 1918	1, 366, 100 1, 013, 000 1, 226, 000 1, 216, 100 1, 223, 500 1, 369, 900 1, 413, 400 1, 517, 800 1, 647, 100	815. 5 814. 8 807. 7 893. 7 785. 5 784. 3 845. 7 775. 4 816. 0 823. 1 873. 7	1, 055, 765 1, 055, 133 1, 103, 415 905, 109 962, 855 953, 784 1, 034, 679 1, 062, 237 1, 153, 278 1, 249, 276 1, 439, 071	10.1 9.3 9.4 10.8 12.8 9.8 9.1 14.7 24.0 28.0	106, 374 102, 142 85, 210 104, 063 122, 481 101, 411 96, 281 169, 672 300, 449 402, 264	357, 196 355, 327 379, 845 418, 797 449, 750 348, 346 443, 293 411, 599 280, 171 629, 288	46, 838 48, 203 54, 740 67, 977 61, 175 45, 809 48, 078 49, 105 86, 991 83, 951	313, 085 309, 171 327, 199 353, 575 391, 196 306, 426 400, 624 370, 987 211, 962 577, 323
1919 1919 1920 1921 1922 1923 1924	1, 951, 000 1, 960, 000 1, 427, 000 1, 695, 000 1, 877, 000 1, 637, 843 1, 705, 800	736. 6 751. 1 807. 3 749. 6 735. 6 807. 2 719. 4 733. 6	1, 372, 993 1, 465, 481 1, 582, 225 1, 069, 693 1, 246, 837 1, 515, 110 1, 106, 340 1, 251, 343	39. 0 21. 2 19. 9 23. 2 19. 9	570, 868 335, 675 212, 728 289, 248 301, 096	648, 038 506, 526 463, 389 454, 364 597, 630	94, 005 58, 923 65, 225 73, 796 52, 380 75, 131	570, 858 456, 477 403, 492 386, 213 550, 404
1925 1926 1927 1928 1929 1930 1930	1, 757, 300 1, 656, 400 1, 584, 900 1, 894, 100 1, 987, 800 2, 101, 100	783. 3 783. 6 764. 7 725. 7 773. 5 778. 3 797. 2	1, 376, 628 1, 297, 889 1, 211, 900 1, 374, 547 1, 537, 193 1, 635, 210 1, 610, 098	18. 2 18. 2 21. 2 4 20. 2 4 18. 6 4 12. 9 4 9. 7	250, 774 236, 702 256, 882 277, 506 286, 104 211, 102 156, 097	537, 240 516, 402 489, 996 565, 925 600, 181 591, 020	08, 281 91, 089 79, 112 76, 891 63, 181 75, 426	470, 651 426, 545 413, 299 491, 542 541, 312 517, 372

Bureau of Agricultural Economics. Italic figures are census returns, other acreage, yield, and production figures are estimates of the crop-reporting board. See p. 970, 1927 Yearbook, for data for earlier years.

<sup>&</sup>lt;sup>1</sup> Compiled from Commerce and Navigation of the United States, 1890-1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States; June issues 1919-1928, January and June issues, 1927-1931, and official records of the Bureau of Foreign and Domestic Commerce.
<sup>2</sup> Total exports (domestic exports plus foreign) minus imports.
<sup>3</sup> Revised on basis of 1899.

A Season average price; for 1931 based on sales previous to Dec. 15. Preliminary.

Table 168.—Tobacco: Acreage and production, by States, average 1924-1928, annual 1928-1931

					Acres	ge								P	rodue	tion	ı			
State	A vera 1924- 1928	- (	192	3	1926	,	193	0	1931	1	A vers 1924 1925	- 1	192	3	1929	,	19	80	198	11
Mass Conn N. Y Pa. Ohio Ind Wis Minn Mid Va W. Va N. C S. C Ga	25, 1, 38, 44, 15, 33, 31, 191, 7, 599, 105, 72, 7,	760 800 360 200 980 760 400 200 360 600 200 400 540 960	25, 37, 40, 13, 37, 1, 4, 31, 180, 728, 148, 122, 12	600 800 500 700 000 000 800 800 000 300	40, 51, 19, 38, 1, 5, 33, 178, 7, 736, 118, 98,	200 \$00 500 500 500 500 500 200 000 0	23, 41, 48, 17, 43, 2, 6, 35, 186, 0, 766, 114, 10	300 400 900 300 100 400 , 200 , 300 , 000 , 000 , 000 , 000 , 000 , 000 , 000 , 000	40, 54, 17, 40, 1, 8, 38, 163, 689, 98, 98,	500 500 900 900 400 900 100 000 200 000 100	33, 1, 50, 37, 13, 38, 24, 127, 6, 407, 66, 52, 6,	061 511 570 856 175 531 868 377 369 153 697 469 552 715	9, 29, 1, 49, 32, 11, 48, 20, 104, 5, 499, 82, 84, 9,	462 750 580 198 234 100 400 460 408 288 387 216	1, 51, 40, 16, 48, 1, 24, 119, 487, 87, 89,	898 496 012 232 953 072 125 800 732 750 794 513 968 084 670 630	35 44 11 55 11 11 58 9	, 728 2, 409 855 3, 695 5, 695 2, 890 2, 875 6, 625 2, 530 8, 900 8, 600 4, 538 9, 756	28 58 53 10 44 46 77 5	), 184 ), 295 ), 17( 3, 48; 3, 62; 3, 06 7, 20 2, 18 3, 50 1, 54 8, 52 7, 59 7, 59
Ky Tenn La	413, 117, 1,	680 680	109.	600 600	134,	000		,000		000		846 422	80,	700 775 405	115.	688 776		2, 12; 6, 699		6, 89 7, 52
U. S	1, 719,	700	1, 894,	100	1, 987,	300	2, 101	, 100	2, 019,	600	1, 302,	463	1, 374,	547	1, 537,	193	1, 63	5, 210	1, 61	0, 09

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

Table 169-Tobacco: Acreage, yield, and production, by types, 1930 and 1931

Class and type	Ţypo	Harv acre		Yielo ac		Produ	etion	Price pou	
and 0, pv	Nō.	1930	1931 1	1930	1931	1930	1931 1	1930°	19313
Flue-oured: Old belt. Virginia. North Carolina. Eastern North Carolina belt. South Carolina belt. North Carolina. South Carolina. Georgia and Florida belt. Georgia and Florida belt. Florida.	11 11 12 13		1,000 acres 366. 5 106. 5 260. 0 370. 0 149. 2 51. 2 98. 0 89. 0 83. 0 6. 0	Lbs. 699 572 757 763 841 822 850 907 914 791	Lbs. 629 579 650 688 732 765 715 700 707 728	1,000, pounds 294,094 76,078 218,016 315,852 145,292 46,692 98,600 109,008 103,233 5,775	169, 000 254, 697 109, 238 39, 168 70, 070	Cts. 11. 0 7. 9 12. 0 13. 4 12. 4 13. 2 12. 0 9. 9 10. 4	Cts. 8.5 7.6 8.9 9.4 10.0 11.5 9.2 6.4 7.0
Total, flue-cured	11-14	1, 128. 0	974. 7	766	675	864, 276	657, 715	12.0	8.9
Fire-cured: Virginia Clarksville and Hopkinsville Kentucky Tennessee Paducah Kentucky Tennessee Henderson stemming (Ky)	23	38. 0 128. 5 54. 5 74. 0 55. 5 48. 0 7. 5 12. 0	41. 0 126. 9 52. 9 74. 0 63. 0 55. 0 8. 0 12. 8	614 753 690 800 685 686 678 745	750 808 800 813 842 845 825 853	23, 325 96, 805 37, 605 59, 200 38, 033 32, 948 5, 085 8, 940	30, 750 102, 498 42, 320 60, 178 53, 075 46, 475 6, 600 10, 944	8.3 10.4 7.5 12.3 5.7 5.3 8.2 6.9	5. 1 6. 7 5. 5 7. 6 4. 9 4. 8 5. 5 5. 0
Total, fire-cured	21-24	234. 0	243. 7	714	809	167, 103	197, 267	8. 9	5.9
Air-cured (light): Burley. Ohio. Indiana Missouri. Virginia. West Virginia. North Carolina Kentucky. Tennessee. Southern Maryland	31 31 31 31 31 31 31 31	470. 7 17. 0 13. 8 6. 2 9. 2 6. 3 7. 2 340. 0 71. 0 35. 0	528. 8 20. 4 13. 8 8. 1 9. 5 7. 2 7. 8 396. 0 66. 0 38. 0	738 760 678 916 1,060 620 750 709 835 475	879 954 923 1,050 950 740 725 875 875 875 830	347, 297 12, 920 9, 356 5, 679 9, 750 3, 906 5, 400 241, 000 59, 286 16, 625	19, 458 12, 734 8, 505	15. 4 17. 1 16. 8 15. 8	10.9 10.9 9.3 11.0 10.0 11.5 11.0 10.9 11.0 24.0
Total, air-cured (light)	31-32	505. 7	566.8	720	876	363, 922	496, 495	16. 0	11.7

<sup>&</sup>lt;sup>1</sup> Preliminary.

<sup>&</sup>lt;sup>1</sup> Preliminary.

<sup>&</sup>lt;sup>2</sup> Season average price.

Table 169.—Tobacco: Acreage, yield, and production, by types, 1930, and 1931—Continued

Class and type	Type No.		vested reage		ld per cre	Prod	uction	Pric po	e per und
	No.	1930	1931	1930	1931	1930	1931	1930	1931
Air-cured (dark): One sucker	35 35 35 36		1,000 acres 35.3 3.4 27.9 4.0 41.4 6.0	Lbs. 807 850 820 695 785 582	Lbs. 852 943 855 750 889 800	1,000, pounds 29,388 2,890 23,370 3,128 28,260 3,377	1,000 pounds 30,080 3,206 23,854 3,000 36,797 4,800	Cts. 7. 0 6. 0 7. 0 8. 2 8. 9 7. 7	Cis. 5.1 12.0 4.0 6.5 4.5 6.0
Total, air-cured (dark)	35-37	78.2	82. 7	780	866	61, 025	71,657	7. 9	4.9
Cigar filler: Pennsylvania Seedleaf	41 42-44 42-44 42-44 45 45 45	40.9 30.5 30.3 .2 1.3 .6	40. 5 32. 6 32. 4 .2 1. 2 .5 .7	964 1, 061 1, 061 1, 060 1, 151 1, 175 1, 130	1, 431 1, 007 1, 010 600 882 870 890	39, 428 32, 347 32, 135 212 1, 496 705 791	57, 955 82, 844 32, 724 120 1, 058 435 623	6. 4 10. 1 10. 1 9. 0 20. 0 20. 0 20. 0	10.0 7.5 7.5 9.2 15.0 15.0
Total, cigar filler	41-45	72.7	74. 3	1,008	1, 236	73, 271	91, 857	8.3	9. 2
Cigar binder: Connecticut Valley Broadleaf Massachusetts Connecticut Connecticut Valley Havana Seed	51 51 51 51	12.4 .5 11.9	18. 2 . 5 12. 7	1, 495 1, 500 1, 495 1, 503	1, 410 1, 412 1, 410 1, 367	18, 540 750 17, 790	706 17, 907	25. 1	17. 1 17. 0 17. 1
Massachusetts	52 52	6. 4 5. 5	6. 0 5. 1	1,490 1,518	1, 400 1, 328	17, 885 9, 536 8, 349	8, 400 6, 773	21. 9 21. 0 23. 0	15.0 15.0 15.0
Havana Seed New York Pennsylvania Southern Wisconsin Northern Wisconsin Misconsin Minnesota	53 53	23. 2 22. 1 19. 8 2. 3	1. 8 . 9 . 4 23. 1 18. 8 16. 9 1. 9	985 1,000 1,065 1,256 1,205 1,200 1,250	1, 309 1, 300 1, 330 1, 221 1, 127 1, 124 1, 150	1, 281 855 426 29, 130 26, 635 23, 760 2, 875	28,200	11. 0 9. 8 10. 3 10. 2	11.7 11.5 12.0 8.0 8.1 8.0 8.5
Total, eigar binder	51-55	70. 9	67. 5	1,318	1, 257	93, 471	84, 873	15. 3	11.3
Cigar wrapper: Connecticut Valley Shade- grown. Alassachusetts	61 61 61 62 62	7.4 1.4 6.0 3.4	5.8 1.1 4.7 2.9	1, 042 1, 030 1, 045	982 980 982 1,069	7, 712 1, 442 6, 270 3, 790	5, 693 1, 078 4, 615 3, 101	90. 0 90. 0 90. 0 80. 0	80. 0 80. 0 80. 0
Florida	62	2.9	2.4	1, 200 1, 100	970 1, 090	8, 190	485 2, 616	80. 0 80. 0	50.0 50.0
Total, cigar wrapper		10.8	8, 7	1, 065	1, 011	11, 502	8, 794	80. 1	69. 5
Miscellaneous (eastern Ohio)		.8	1, 2	800	1, 200	640	1, 440	5, 9	0.6
United States	All	2, 101. 1	2, 019. 6	778.3	797.2	1, 685, 210	1, 610, 098	12.9	9.7

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

Table 170.—Tobacco: Acreage, yield per acre, and production in specified countries, annual 1929-30 to 1931-32

	I	creage	,	Yiel	d per s	acre		Production	n.
Country	1929- 30	1930- 31	1931- 32 1	1929- 30	1930- 31	1931- 32	1929-30	1930-31	1931-32
North America, Central America, and	1,000	1,000	1,000				1,000 lbs.	1,000	1,000
West Indies:	acres 36	acres	acres	Lbs. 823	Lbs. 887	Lbs.	29, 886	lbs.	lbs.
Canada United States 2	1, 987	2. 101	2,020	774	778	797	1, 537, 193	36, 713 1, 635, 210	48, 23
Mexico	42	35	3 35	683	701		28, 51	24.198	8 24, 11
Cubo	150			457			68, 64	82, 117	
Dominican Republic Porto Rico	39	•43		555	623		44, 97	24,030	
Europe:	່າ	•43		630	623	i	24, 60	26,786	
Sweden	1 1	1		1, 632	1, 857	1	1.23	1.344	
Belgium	1 7	1 7	7	2,020 1,717	2, 113	1,820	1, 23 15, 03	15,387	12, 73
Franco	37			1,717		l	1 62,90	3	
Spain Italy	7	12		1, 578 1, 122	1, 481	}	10, 37	17,415	
Garmany	95 24	108 23	26	2 138	1, 010 2, 025	2 060	106, 16	108,772	3 46, 31
Germany	16	18	22	2, 136 1, 282 1, 199	1, 242	2, 060 1, 263	50, 92 20, 20	46,408 7 22,095	27, 77
Hungary	55	58		1, 199	1, 293	2, 200	1 65.80	2 75.372	3
Hungary Yugoslavia	38	38		802	827	1	30, 40	81,398	il
Greece Bulgaria	250					504		152,658	98, 76
Bulgaria	91 76		77		678 623	711	72, 26	52, 825	54, 78
Rumania Poland	16			759 1, 200			57, 31 19, 63	53,011 8 13,080	
Russia	240		106		1, 231		263, 51	305, 183	
North Africa:		~~	1 ~~	1,000	1 -,				i
Algeria	53		40		758	507		0 43, 485	20, 25
Tunis Tripolitania	1	1		881			92		
Tripolitania		1	1		1, 543	1, 323		1,543	1, 35
Asia: Turkey 4	120	73	l	611	681		79.04	40 970	J
Iraq	120			1, 489			12, 37	14,560	
Palestine	5			551	2,00		2, 63	2	
Palestine Syria and Lebanon	. Š	10	21			576	6, 51	2 6, 967	12, 0
India	1 1, 359	31, 172		993			1, 349, 21	4 49,879 6 14,560 2 6,967 5 1,404,330	)
Ceylon Indo-China	14	7 91		649	7 7776		8, 81 24, 21	0	.!
Japan	6 33 88	7 21 89	91	6 731 1, 542	7 772	1, 712		1 145, 17	155, 7
Chosen (Korea)	48	35		1, 190	958	1,	1	າ 33.29	11
Chosen (Korea) Taiwan (Formosa)	2			1. 512	1.637	1	3, 32	8 3,310	3
Siam	25			373			9, 18	0	
Siam Philippine Islands	204	198		512	514	·	104, 53	9 101,66	2
South America: Brazil			1	l		t	194, 52	1	1
Chile	8			1, 673			13, 30	6	
Argentina	30			974			13, 30 29, 27	7	
South Africa:	"		1	1	1	1	1	1	
Union of South Africa						J	13, 25	0 3 13,70	3 10, 2
Southern Rhodesia	10 10	16	26		527	541	10 5, 84 10 1, 35	4 8, 49	14,0
Northern Rhodesia Nyasaland	10 4 52			378 266			13, 82	2 15, 99	3 16. 0
Madagascar	23			801			18, 65	1 18,51	
Oceania:	~	1 -		1	1	}	1,		i
Java and Madura 11	69			959			65, 74	5 66, 29	0
Sumatra 8	52			824			42, 69	3 41,317	7
Australia.	2			641			1, 38	2	
Total all countries reporting						1			
Total, all countries reporting acreage or production all years.	2, 868	2.912	3,004				2, 125, 75	6 2, 219, 30	2, 151, 2
Estimated world total, exclusive of China 12	7,000	-, -,-	1, 10.	1		1			1
							5, 007, 00		

Bureau of Agricultural Economics. Compiled from official sources and International Institute of Agriculture except as otherwise stated. Acreage and production figures are for the harvesting season. In the Northern Hemisphere data for 1930-31, for example, are for crops harvested in the summer and fall of 1930; in the Southern Hemisphere they are for crops harvested in the spring of 1931, except in the Dutch East Indies, where the barvest was largely completed in 1930.

<sup>1</sup> Preliminary.
2 Revised December, 1931, on basis of 1930 census returns.
3 Unofficial estimate.
4 Turkey in Europe and in Asia.
5 British Provinces only.

<sup>8</sup> British Provinces only.
6 Exclusive of Leos.
7 Exclusive of Leos and Cambodia.
8 Exclusive of Cambodia.
9 Data for European plantations only.
10 Cultivation by Europeans.
11 Estate production only.
11 No data are available for total production of China, which is of considerable importance.

Table 171.—Tobacco: Yield per acre and estimated price per pound, December 1, by States, averages, and annual 1926-1931

			Yie	ld per	acre				Estir	nated	price	per	ound	l
State	Av., 1919- 1928	1926	1927	1928	1929	1930	1931	Av., 1925– 1929	1926	1927	1928 1	19291	1930 1	19311
Massachusetts Connecticut New York Pennsylvania Ohio Indiana Wisconsin Minnesota Missouri Maryland Virginia West Virginia North Carolina Goorgia Florida Kentucky Tennessee Louislana	Lbs. 1, 344 1, 341 1, 190 1, 359 869 1, 187 773 662 786 645 658 933 816 758 441	1, 340 1, 100 1, 320 846 884 1, 150 950 840 725 850	Lbs. 1, 223 1, 223 1, 200 1, 360 8119 760 1, 070 1, 100 1, 100 818 723 775 737 725 935 936 400	1, 190 1, 275 1, 340 795 820 1, 300 1, 100 660 750 686 556 690 768	1, 370 1, 124 1, 265 820 1, 250 1, 200 750 673 745 663 738	1, 385 950 965 950 716 1, 230 1, 250	1, 302 1, 300 1, 430 993 923 1, 180 1, 150 1, 050 830	35. 3 18. 8 12. 9 16. 3 18. 1 15. 2	Cts. 35. 0 35. 6 19. 0 10. 5 10. 1 9. 7 13. 8 15. 0 23. 7 17. 6 13. 1 20. 4 23. 3 24. 0 37. 8 10. 5	36.6 18.0 13.0 18.4 22.0 16.0 23.0 17.8 24.5 22.0	37. 2 19. 3 14. 0 22. 0 24. 0 12. 0 28. 6 27. 3 16. 0 26. 8 19. 5 12. 7 13. 2 29. 1 21. 2	15. 5 12. 0 16. 0 16. 9 15. 0 14. 5 21. 9 27. 7 17. 6 20. 5 18. 5 18. 7 82. 2	37. 1 12. 0 6. 4 11. 1 9. 1 10. 0 10. 5 15. 4 29. 0 8. 8 12. 9 12. 0 10. 3 27. 4	10. 0 8. 7 9. 8 8. 0 8. 5 11. 0 24. 0 7. 0
United States	764. 2	783. 6	764. 7	725. 7	773. 5	778, 3	797. 2	19.3	18. 2	21. 2	20. 2	18. 6	12,9	9. 7

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

Table 172.—Tobacco: Production, stocks, supply, disappearance, and price, 1927-1931

## FLUE-CURED, TYPES 11-14

Year	Produc- tion <sup>2</sup>	Stocks on hand July 1	Total supply	Dis- appear- ance, year he- ginning July 1		Year	Produc- tion <sup>2</sup>	Stocks on hand July 1	Total supply	Dis- appear- ance, year be- ginning July 13	
1927 1928 1929	Million pounds 715. 9 740. 8 749. 8	pounds 466. 5 565. 0	Million pounds 1, 182. 4 1, 305. 8 1, 339. 8	Million pounds 617.4 715.8 740.5	Cents 21.3 17.7 18.0	1930 1931	Million pounds 864.3 1657.7	pounds 599. 3	Million pounds 1,463.6 1,334.5	Million Pounds 786.8	Cents 12.0 3 h. 9

### VIRGINIA FIRE-CURED, TYPE 21

Year	Produc- tion 3	Stocks on hand Oct. 1	Total supply	Dis- appear- ance, year be- ginning Oct. 1			Produc- tion ?	Stocks on hand Oct. 1	Total supply	Dis- appear- ance, year be- ginning Oct. 12	
1927 1928 1929	Million pounds 26. 6 21. 9 22. 8		Million pounds 82.7 70.9 54.1	Million pounds 33. 7 39. 6 26. 2	Cents 9.9 10.6 16.9	1930 1931	Million pounds 23. 3 3 30. 8	Million pounds 27. 9 28. 6	Million pounds 51. 2 59. 4	Million pounds 22. 8	Cents 8.3 8.5.1

Bureau of Agricultural Economics. Stock prior to 1929 compiled from reports of the Bureau of the Cansus.

\* Estimated December, 1931.

<sup>&</sup>lt;sup>1</sup> Season average price; for 1931 based on sales previous to Dec. 15.

<sup>1</sup> Production and price data, 1929-1931, revised December, 1931, on basis of 1930 census returns.

2 Green weight basis, i. e., farmers' sales weight. Disappearance includes consumption, exports, and

Table 172.—Tobacco: Production, stocks, supply, disappearance, and price, 1927—1931—Continued

# KENTUCKY AND TENNESSEE FIRE-CURED, TYPES 22 AND 23

				Disap-	Average per po						Disap-	THE THE	
Year	Pro- duc- tion <sup>3</sup>	Stocks on hand Oct. 1	Total supply	ance,	Clarks- ville and Hop- kins- ville	Pa- du- cah	Year	Pro- duc- tion 2	Stocks on hand Oct. 1	Total supply	pear- ance, year begin- ning Oct. 1 2	Average per por per por por ville and Hop-kins-ville  Cents 10.4 3 6.7	Pa- du- cah
1927 1928 1929	Mil- lion pounds 81. 0 104. 2 155. 0	Mil- lion pounds 161. 9 114. 1 104. 1	Mil- lion pounds 242. 9 218. 3 259. 1	Mil- lion pounds 128. 8 114. 2 152. 0	Cents 18. 5 15. 6 14. 2	Cents 12. 2 12. 7 10. 0	1930 1931	Mil- lion pounds 134. 8 4 155. 6	Mil- lion pounds 107. 1 129. 2	Mil- lion pounds 241. 9 284. 8	Mil- lion pounds 112.7	10.4	Cents 5.7 8 4.9

## HENDERSON FIRE-CURED, TYPE 24

1927 1928 1929	pounds 4. 2 6 0 9. 5	pounds 7. 2 4. 6 . 7	pounds 11. 4 10. 6 10. 2	pounds 6.8 9.9 9.5	Cents 9.7 12.0 9.5	1930 1931	pounds 8.9 3 10.9	pounds 0. 7 3. 1	pounds 9.6 14.0	pounds 6.5	Cents 6.9 85.0
				В	URLEY,	TYPE	31				
1927 1928 1929	180. 2 270. 6 342. 2	451. 3 347. 8 332. 4	631. 5 618. 4 674. 6	283. 7 286. 0 301. 6	26. 0 30. 4 21. 8	1930 1931	347. 3 8 465. 0	373. 0 436. 8	720. 3 901. 8	283. 5	15. 4 8 10. 9
			so.	UTHER	N MAR	YLAND,	TYPE	82			
1927 1928 1929	26. 2 20. 5 24. 8	21. 9 25. 1 19. 0	48. 1 45. 6 43. 8	23. 0 20. 6 26. 6	23. 4 27. 2 27. 7	1930 1931	16. 6 8 31. 5	17. 2 22. 1	33. 8 53. 6	11.7	29. 0 8 24. 0
				ONE	-sucke	R, TYP	E 35				
1927 1929 1929	13. 1 20. 1 29. 9	41. 7 26. 9 21. 4	54.8 47.0 51.3	27. 9 25. 6 26. 2	10. 6 12. 2 10. 5	1930 1931	29. 4 3 30. 1	25. 1 32. 3	54. 5 62, 4	22.2	7. 0 3 5. 1
				GRE	EN RIV	ER, TYE	PE 36				
1927 1928 1929	18. 1 18. 9 27. 4	48. 4 40. 1 30. 8	66. 5 59. 0 58. 2	26 4 28. 2 84. 4	9. 1 11. 6 10. 7	1930 1931	28. 3 3 36. 8	23, 8 24, 2	52. 1 61. 0	27.9	8.9 84.5
			VIRG	INIA S	UN-CUR	ED, TY	PE 37				
1927 1928 1929	5. 5 5. 0 4. 1	5. 9 5. 1 5. 5	11. 4 10. 1 9. 6	6. 3 4. 6 5. 7	13. 1 10. 1 13. 2	1930 1931	3.4 848	3. 9 3. 5	7. 8 8. 3	3.8	7. 7 8 6. 0

Green weight basis, i. e., farmers' sale weight. Disappearance includes consumption, exports, and sees.
 Estimated December, 1931.

Table 172.—Tobacco: Production, stocks, supply, disappearance, and price, 1927-1931—Continued

# PENNSYLVANIA CIGAR LEAF, TYPES 41 AND 534

1927 1928 1929	por	non inds 46. 2 49. 6 51. 2	Million pounds 84. 1 84. 6 84. 3	130. 3 134. 3 135. 4	8   po	unds 45. 7 49. 9 54. 8	Cents 13. 0 14. 0 12. 0	1930 1931	p	39. 9 358. 5	pounds 80. 1 75. 1	pound 120. 133.	0	ounds 44.9	Cents 6.4 3 10.6
					M	IAMI V	ALLE	Ү, ТҮР	ES	42-44					
1927 1928 1929	<u> </u>	16. 6 20. 1 20. 7	56. 8 46. 9 39. 9	73. 4 67. 6	)	26. 5 27. 1 24. 2	15. 6 17. 5 13. 8	1930 1931		32.3 32.8	36. 4 54. 2	68. 87.		14. 5	10. 1 3 7. 5
				NE	W E	NGLAI	ND BR	OADLE	AF	, TY	PÆ 51				
1927 1928 1929		15. 0 14. 2 12. 1	37. 7 31. 4 31. 0	52. 45. 43.	5	21. 3 14. 6 18. 3	21. 0 21. 0 27. 4	1930 1931		18.5 3 18.6	24. 8 29. 9	43. 48.	3	13. 4	25. 1 3 17. 1
			NE	W EN	GL!	ND H	AVAN	A SEED	, Т	YPES	52 ANI	O 65			
		odue- on <sup>2</sup>	d Oct. 1		o, year	pric	erage e per und		P	roduc- tion 3	d Oct. 1		e, year	·In	erage ce per ound
Year	Primed Havana seed	Havanaseed	Stocks on hand	Total supply	Disappearance, beginning Oct.	Primed Havana seed	Havana seed	Year	Primed IIa-	Vana seed Havana seed	Stocks on hand Oct. 1	Total supply	Disappearance,	Primed Havana seed	Havanaseed
1927 1928 1929	Mil- lion lbs. 0.7 .6 .3	Mil lion lbs. 15. 0 17. 1	lion   lbs.   42.4   5   36.9	Mil- llon lbs. 58.7 55.0 49.5	Mil- lion lbs. 21. 8 23. 6 16. 6	Cents 30.0 30.0	Cents 23.4 24.0 31.1	1930 1931	M lio	n lio	n lion lbs. 9 32.9	Mil- lion lbs. 50.8 48.6	Mil lion lbs. 17.	. Cent	Cents 21.9
				WISC	ON8	IN CIO	AR LI	EAF, TY	PE	CS 54 .	AND 55		•		
Year		oduc- ion <sup>s</sup>	Stocks on hand Oct. 1	Tota suppl	l al	ar be-	verage price per pound	Year	J	Production 3	Stock on hand Oct. 1	Tota supp	ly y	Dis- ppear- ance, ear be- inning Oct.1	Average price per pound
1927 1928 1929		illion unds 33. 2 49. 3 49. 9	Million pounds 83.1 72.5 86.7	Millio pound 116. 121. 136.	is p	fillion ounds 43. 8 35. 1 51. 3	Cents 16. 0 14. 5 15. 0	1930 1931	1	Million pounds 55.8 3 49.4	pounds 85. 3		ds p	Aillion counds 35.9	Cents 10.0 3 8.0

Green weight basis, i. e., farmers' sale weight. Disappearance includes consumption, exports, and essentiated December, 1931.

Disappearance includes consumption, exports, and Does not include New York Havana seed.

Table 173.—Tobacco: Stocks in hands of dealers and manufacturers, first of each quarter, 1927-1931

				·	,				
Type and year	Jan. 1	Apr. 1	July 1	Oct. 1	Type and year			July 1	
					Ohio cigar leaf (Mi- ami Valley), types 42, 43, and 44: 1927- 1929- 1930- 1931- Goorgia-Florida cl- gar leaf, sun and				
Flue-cured, types 11, 12, 13, and 14: 1927	1,000	1,000	1,000	1,000	ami Valley), types	1,000	1,000	1,000	1,000
12, 13, and 14:	000 574	TOUTION EER 707	Doungs	pounas	42, 43, and 44:	pounds	pounds	pounds	pounds
1000	756 535	879 059	400, 470 604 000	661 017	1927	62, 400	72,037	64,386	56, 774
1020	766, 270	703 306	580 079	880 070	1928	48, 420	60,696	55, 515	46,875
1930	795, 484	707, 149	599, 282	887 789	1020	24 500	55,392	47,094	39,888
1931	868, 983	831, 347	676, 752	739, 356	1931	30, 502	51 220	50 455	86, 427
Virginia fire-cured, type 21: 1927			,	1	Georgia-Florida ci- gar leaf, sun and shade types 45 and	50, 502	02,000	00, 200	04, 101
tyne 21:					gar leaf, sun and			1	
1927	53,065	73, 510	65, 052	56, 140	singue types 45 and	1		, ,	
1928	57,000	64, 931	59,409	49,040	1 62:	1		1, 876 2, 618	
1929	47,633	49,092	38, 216	31, 268	1927 1928	4,088	3, 190	1,876	4,879
1930	34, 997	40,021	35,625	27,917	1928	4,461	4,019	2, 618	7,081
1931	33, 392	38,364	33, 241	28,607	1929 Georgia and Florida	5,994			
Kentucky and Tennessee fire-cured, types 22 and 23: 1927 1928 1929 1930 1931					Georgia and Florida	I	ł	1	l
nessee fire-cured,				1	Sun-grown, type 45: 1929- 1930- 1931- Porto Rico eigar leaf, type 46: 1927	İ	1 177	803	0.070
types 22 and 23:				1 1	1030	1,538 2,033	1, 174 1, 319 2, 223	1 240	9 9/6
1927	132, 340	198, 465	186, 791	161, 939	1031	2,033	2, 222	1,340 1,580	2,078 2,345 2,419
1928	150,328	168,012	143,883	114, 120	Porto Rico cigar leaf.	2,000	-,	2,000	2,210
1929	100, 902	140, 420	133, 719	104, 131	type 46:	1			l
1930	100, 800	154 404	140,800	107,008	1927	18, 577	17, 639 23, 646 26, 128 28, 442	13, 746	16, 583
1891	100, 301	104, 404	100,040	129, 349	1928	21, 426	23, 646	21, 172	20,067
Henderson fire-cured			1		1929	22, 230	26, 128	25, 142	25, 270
(stemming), type			ł		1930	. 29, 039	28, 442	24, 734	23,510
Henderson fire-cured (stemming), type 24:	0 745	** ***	0.00	- 040	1931	18, 577 21, 426 22, 230 29, 039 27, 284	27, 932	24, 940	16, 589 20, 067 25, 270 23, 510 23, 546
192/	7 404	11,190	9,987	7, 242 4, 583	New England broad		1		
1927	2 448	2 850	5,314 1,288 2,291 4,212	711	leartype or:	40 979	10 100	48 005	27 700
1030	2, 704	£,089	2, 201	736	1020	30, 270	20, 200	45, 925	37, 709
7931	3, 788	8, 519	4, 212	3, 102	1020	28, 102	37 880	34 458	31,441 31,016 24,809
Burley type 21:	-,	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		0,202	1930	29, 507	30, 072	28, 960	24, 809
1027	460 811	586. 337	518. 363	451 251	1931	23, 438	46, 483 38, 918 37, 880 30, 073 30, 758	32, 205 34, 458 2 28, 960 33, 377	29,969
1028	438, 267	475, 508	411.005	347 827	New England Ha-				,
1929	354, 772	465, 941	396, 541	332, 382	vana seed, type 52:		1	1	1
Burley, type 31: 1927 1928 1929 1930 1931	352, 803	506, 378	438, 659	373, 032	type 46: 1927 1928 1929 1930 1931 New England broad leaf type 51: 1927 1928 1929 1930 1931 New England Havana seed, type 52:	43, 524 40, 889 38, 076	49, 565 45, 376	44, 582 46, 068	42, 408 36, 905
1931	407, 557	568, 010	500, 042	436, 802	1928	40,889	45, 376	46,066	36,905
					1929	38,076	30, 940	35, 558	31,388
Southern Maryland, type 32: 1027		1	1	i	1927 1928 1929 1930 1931	33, 48 32, 730	43, 46 42, 17	35, 558 35, 732 38, 265	32,898
1927	18,699	12,447	12, 523	21,899	Now York Warner	- 32, /31	42,17	08,200	33, 442
1928	15, 314	10,848	12, 104	25, 132	need type 52.	1	1	1	
1929	20, 245	13, 134	13, 293	18,982	1927	3, 783	4.42	3, 509	3 104
1930	15,304	11,960	9,553	17, 167	1928	2, 67	2,60	2,608	2,279
1931	17,038	14, 618	11,756	22, 109	1931 New York Havana seed, type 53: 1927- 1928- 1929- 1930-	3, 78 2, 67 2, 05 2, 39 2, 83	4, 42 2, 60 3, 34 5 2, 81 7 3, 55	2, 608 2, 781 2, 533 3, 644	3, 196 2, 279 2, 200 2, 166 3, 034
One-sucker, type 85: 1927- 1928- 1929- 1930- 1931-					1930	2, 39	2,81	2, 533	2, 166
1927	46,601	59, 143 39, 818 37, 666 38, 218 48, 357	48, 245 32, 399 26, 496 30, 283 41, 026	41,668 26,882 21,374	Wisconsin cigar leaf,	2,837	3, 558	3, 644	3,034
1928	38, 813	39, 818	32, 398	26, 882	Wisconsin cigar leaf,	I .	<b>!</b>	1	
1020	28,067	37,000	20,490	21,074	type 54: 1927 1928	00 =0	100 10		
1031	20, 502	40 25	41 096	25, 123 32, 324	1927	82, 781	107, 15	96, 608	83,058
Green River, type 36: 1927. 1928. 1929. 1930. 1931.	40,100	30,001	41,020	02,022	1928	09, 920	94, 13	96, 658 84, 924 5 97, 380 97, 023 112, 558	72,043
Green River, type so:	E4 101	AD 111	E4 800	48, 447 40, 127 30, 750 23, 786 24, 242	1929	79 814	101 49	07 022	25 274
1098	47 979	63, 118 49, 127 35, 968 35, 618 29, 308	42 799	40, 127	1931 New England shade- grown, type 61: 1927 1928 1929	73 20	97.51	1112 555	105 180
1020	41 199	35 000	25 670	30 750	New England shade	- 10, 20.	0.,02	1	1200, 200
1930	30, 824	35, 618	28 533	23, 786	grown, type 61:	1	1		i
1931	27, 369	29, 308	26, 136	24. 242	1927	8, 659 8, 363 8, 722 11, 329 11, 771	7, 600 7, 872 8, 740 10, 493 10, 818	6, 494 5, 878 5, 954 10, 207	6, 492 6, 815 6, 476 10, 162
Virginia sun-cured		,	1	1	1928	8, 363	7,878	5,878	6,815
type 37:	1			1	1929	8,722	8,74	5, 954	6,476
1927	5, 482 6, 504 4, 422	7,966 7,558 7,918	7. 236	5, 925 5, 052 5, 492		11, 32	10,499	10, 207	10, 162
1928	6, 504	7, 558	6.347	5,052	1931	. 11, 771	10,818	10, 255	10,863
1929	4, 422	7.918	6,073	5,492	l) (learrois and kinnide		1		1
1930	4, 941 3, 855	5,820	4, 93	3,878	shade, type 62: 1929	1	9 04	9 804	4 004
Virginia sun-cured, type 37: 1927 1928 1929 1930 1931	3,855	5,820 4,709	7, 236 6, 347 6, 073 4, 938 4, 142	3,455	1929	5, 048 5, 166	3,844 4,950 4,420	3, 564 3, 868 4, 110	4,824 5,921 5,197
Pennsylvania cigar leaf, types 41 and	į.		i	1	1930	5 18	4 426	4 110	K 107
leaf, types 41 and				ì	Miscellaneous Leest-	0, 100	7,200	7 2, 110	0,10
		l			ern Ohio, export:	1	Į.	1	Į
1927 1928 1929	89,708	113, 551	95, 539	84,067	1927	1,375	1,520	1, 501 1, 415	946 985
1928	71,516	106, 646	95, 466	84, 649	1928	1,501	1,67	1,415	985
1929	72, 424		·		Miscellaneous, east- ern Ohio, export: 1927 1928 1929 Miscellaneous, do- mestic, type 70:	1,614	1,520 1,673	.	
Pennsylvania seed-	1	Į.	t .	1	Miscellaneous,2 do-		[		1
loof trong 41s	1				mestic, type 70:	1		1	١
rear, cype ar:				1 00 000	11 1020	1	i 5 02%	a 2 199	s 2.702
1929		115, 639	43,801	83, 300	1 1000		0,000	0, 122	7,000
Pennsylvania seed- leaf, type 41: 1929	73, 186	93, 795	90, 292	79, 592	1929 1930 1931	1, 989	5,925 4,10 2,97	3, 122 2, 932 2, 843	2, 302 2, 918 2, 578

Bureau of Agricultural Economics.

Not including small quantities of other miscellaneous, e. g., Louisiana Perique.
 Includes Eastern Ohio Export and all other tobacco classed as miscellaneous.

Table 174.—Tobacco: Exports, by types, 1923-24 to 1930-31

Year beginning October	Flue- cured, types 11-14 1	Virginia fire- cured, type 21	Ken- tucky and Ten- nessee fire- cured, 2 types 22 and 23	Burley, type 31	Southern Mary- land, 3 type 32	Green River, 4 type 36
1923-24 1924-25 1925-26 1926-27 1927-28 1928-29 1928-30	Million pounds 266. 0 207. 5 324. 4 288. 7 328. 9 411. 8 429. 9 432. 7	Million pounds 27. 4 25. 7 19. 3 22. 0 21. 2 18. 1 11. 8	Million pounds 167. 1 125. 3 110. 0 128. 4 84. 7 75. 4 104. 5 74. 1	Affilion pounds 7.7 6.0 5.8 18.1 7.1 6.1 9.7 8.7	Million pounds 19. 2 13. 7 12. 3 18. 8 12. 6 13. 1 7. 8 10. 5	Afillion pounds 16. 2 16. 8 14. 4 14. 2 8. 1 9. 9 8. 9 5. 4

Bureau of Agricultural Economics. Complied from reports of the Bureau of Foreign and Domestic

Table 175.—Tobacco, unmanufactured: International trade, average 1925-1929, annual, 1928-1930

				Calend	ar year			
Country	Average,	1925-1929	19	28	19	29	193	30 1
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES United Stases Dutch Stases Dutch Stases Drazil Brazil Brazil Philippine Islands Cuba British India Dominican Republic Algeria Paraguay Hungary Russia Yugoslavia	109, 224 67, 864 57, 616 47, 940 42, 279 40, 432 36, 528 33, 841 14, 252 12, 392	1,000 pounds 78, 243 11, 967 3, 869 0 674 0 16, 192 0 10, 375 162 7, 393	1,000 pounds 583, 846 154, 127 108, 234 64, 495 40, 381 50, 708 42, 177 31, 014 40, 474 12, 209 15, 185 12, 681 6, 219 1, 643	1,000 pounds 74,797 11,376 44 3,772 0 816 0 16,562 0 11,523 7,562 0 2,663 116	1,000 pounds 565, 902 161, 289 110, 351 67, 251 44, 583 46, 693 37, 623 36, 297 35, 741 18, 995 30, 112 20, 148 7, 453 3, 194	1,000 pounds 68,066 17,098 4,703 0 505 0 17,373 0 12,308 6,483 0 650	1,000 pounds 579, 704 2131, 529 108, 455 80, 949 49, 500 50, 279 58, 791 38, 835 28, 594 25, 932 23, 208 2, 659 1, 294	1,000 pounds 71,543 2 13,690 
Total			1,045		1,250,465		1,199,815	121,855
PRINCIPAL IMPORTING COUNTRIES  Germany United Kingdom China France Netherlands Spain Belgium Czechoslavakia Poland Austria Argentina Austria Argentina Egypt Italy Switzerland Japan Sweden Denmark Irish Free State Finland Norway	82 7 723 2, 111 417 5, 467 7, 333 92 2, 952 168 22 269 0	217, 778 202, 559 104, 548 92, 321 70, 090 53, 809 31, 367 21, 629 17, 067 16, 639 11, 835 83, 809 11, 835 11, 166 12, 839 11, 835 7, 094	683 5, 621 19, 677 3, 082 0 0 83 7 7 335 2, 490 6, 200 0 7, 601 71 814 214 0 0	244, 290 206, 996 142, 647 67, 825 71, 297 68, 156 81, 156 22, 568 33, 245 23, 683 17, 117 13, 334 14, 689 8, 788 12, 312 8, 737 9, 210	916 8, 403 17, 207 2, 471 185 102 2, 492 451 0 7, 244 0 0 9, 345 250 20 108 0 0 0	228, 112 220, 023 121, 450 85, 508 72, 438 67, 416 67, 416 63, 338 28, 819 25, 448 21, 138 17, 73 16, 530 11, 651 15, 651 17, 003 12, 523 9, 328 7, 739 5, 533	0	234, 658 223, 389 124, 349 155, 028 70, 564 57, 770 49, 314 22, 820 22, 878 20, 284 17, 435 16, 673 10, 043 110, 043 112, 462 9, 831 12, 9, 831
Total	54,810	1,058,810	47,991	1,097,251	50,006	1,144,792	49, 478	1, 168, 852

Bureau of Agricultural Economics. Official sources. Tobacco comprises leaf, stems, and strippings, but not snuff.

<sup>&</sup>lt;sup>1</sup> Year beginning July. <sup>2</sup> Includes Henderson fire-cured.

Includes eastern Ohio.
 Includes one-sucker prior to 1927-28.

<sup>&</sup>lt;sup>1</sup> Preliminary. <sup>2</sup> Java and Madura only. <sup>2</sup> 2-year average. <sup>4</sup> 4-year average. <sup>5</sup> Year ended June 30.

## STATISTICS OF FRUITS AND VEGETABLES

Table 176.—Almonds: Production and value, California, 1922-1931

Year	Produc- tion	Seasonal farm price	Farm value	Year	Produc- tion	Seasonal farm price	Farm value
1922	Short tons 8, 500 11, 000 8, 000 7, 500 16, 000	Dollars 290.00 260.00 300.00 400.00 300.00	1,000 dollars 2,465 2,860 2,400 3,000 4,800	1927	Short tons 12,000 14,000 4,700 13,500 14,800	Dollars 320.00 340.00 480.00 200.00 * 176.00	1,000 dollars 3, 840 4, 760 2, 256 2, 700 2, 605

Bureau of Agricultural Economics.

TABLE 177 .-- Apples: Production, car-lot shipments, prices and foreign trade 1919-1931

	D			Average price of			of ments from				n trade	, year be	ginning	ning July :			
	Produ	iction	Price per bushel	Bald- wins per	crop c	f year wn		Domest	ic expo	ts	Im- ports.	Net ex	ports 4				
Year	Total	Com- mer- cial	ceived by pro- ducers Dec. 1	barrel at Bos- ton, sea- son No- vember to April 1	Cars	Equiv- alent bushels <sup>2</sup>		Dried	Dried in terms of fresh	Can- ned in terms of fresh	fresh and dried in terms of fresh	Total	Per- cent- age of pro- duc- tion				
1010	1,000 bush.	1,000 bush.	Dolls.	Dolls.		1,000 bush.	1,000 bush.	1,000 pounds	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	P. ct.				
1919	99, 002 202, 702 202, 842	101, 715 64, 671 95, 835	1. 15 1. 68 . 99	4. 02 6. 69 4. 84	89, 559	53, 735 68, 377	3, 152 7, 995 3, 282 5, 269 12, 295	11, 819 18, 053 12, 431 12, 817 30, 410	1,881 1,295 1,335		849 142 1, 353 189 132	9, 734 3, 224 6, 415	4.4 3.3 3.2				
1930	159, 967 171, 725 172, 389 246, 609 123, 693 186, 893 135, 622 155, 982 211, 506	90, 738 117, 384 78, 051 106, 383 86, 529 101, 004	1. 26 . 74 1. 39 . 99 1. 31 . 93	4, 88 3, 42 6, 60 4, 66 5, 12 3, 12	127, 804 133, 550 93, 094 127, 530 102, 801	77, 885 80, 800 53, 375 80, 151 64, 022 71, 425	11, 015 21, 293 9, 430 21, 043 10, 279	24, 833 32, 670 21, 704 50, 024 23, 769	2, 587 3, 403 2, 261 5, 221 2, 476	310 389 330 663 481	74 84 154 117 309	13, 838 25, 001 11, 867 26, 810 12, 927	8.0 10.1 9.6 14.3				

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board; italic figures are census returns. Prices to producers are based upon returns from crop reporters. Estimates of production for 1929 and 1930 revised on basis of 1930 census. Earlier years not so revised.

<sup>1</sup> Preliminary.

<sup>&</sup>lt;sup>2</sup> Seasonal average price to Dec. 1.

<sup>1</sup> Figures 1919-1922 from Boston Chamber of Commerce reports, average of weekly quotations of price actually paid by wholesale dealers on days quoted. Figures 1924-1930 from Special Apple Market Beport issued by Mass. Dept. of Agr., Div. of Markets, based on prices "for sales by original receivers." 2 For years 1920-1922, it is assumed that the car lots averaged 600 bushels per car. For years 1922 to 1931, inclusive, the estimates of bushels shipped have been calculated according to estimated loadings in each Stata

Compiled from Monthly Summary of Foreign Commerce of the United States, June issues, 1919–1926;
 January and June issues, 1927–1931; and official records of the Bureau of Foreign and Domestic Commerce.
 Total exports (domestic plus foreign) minus imports.

Freliminary.
 December forecast of total shipments from 1931 crop.

Table 178.—Apples: Production, by States, 1926-1931

	- · · · · ·											
			To	tal					Comm	ercial <sup>1</sup>		
State and division	1926	1927	1928	1929	1930	1031 2	1926	1927	1928	1929	1930	1931
Maine	1,000 bush. 2,260 1,240 800 4,100 391 1,900 40,375 4,310 17,000	1,000 bush. 2, 236 1, 100 990 2, 520 242 1, 045 13, 600 2, 697 6, 300	1,000 bush. 1,400 1,000 560 2,700 230 1,500 21,900 3,290 8,460	1,000 bush. 2,480 870 1,029 2,440 285 830 14,412 2,149 6,040	1,000 bush. 2,170 1,256 762 4,389 152 1,615 24,200 4,242 9,936	1,000 bush. 1,310 578 800 1,713 318 675 19,100 8,520 14,000	1,000 bush. 1,350 762 465 2,610 237 1,050 18,000 2,832 5,388	1,000 bush. 1,365 690 570 1,590 150 540 8,163 1,833 2,550	1,000 bush. 861 615 330 1,734 144 753 12,690 2,238 3,129	174 489 10, 212 1, 449	1,000 bush. 1,410 762 477 2,808 270 957 16,125 2,910 3,873	1,000 bush. 789 348 501 1,098 189 402 11,700 2,199 5,514
North Atlantic_	72, 376	80, 730	41, 040	30, 535	49, 022	42, 014	82, 724	17, 451	22, 494	19, 395	29, 592	22, 740
Ohio Indiana Illinois Michigan Wisconsin Minnesota Iowa Missouri South Dakota	8, 652 5, 015 169	5, 600 1, 249 4, 450 4, 288 1, 200 854 1, 720 2, 104 200	3, 380 230	2, 660 1, 085 3, 600 6, 900 1, 967 905 1, 650 2, 200	8, 500 1, 240 8, 708 5, 223 1, 015 975 1, 560	14, 790 3, 990 8, 961 9, 620 1, 820 1, 139 1, 755 8, 000	3, 018 864 3, 870 4, 467 465 171 402 1, 857	270 111 207 870	1, 647 528 3, 720 2, 787 477 114 830 1, 422	3, 618 396 87 255 1, 140	1, 050 291 2, 808 3, 135 210 39 150 849	4, 056 888 5, 490 5, 052 390 111 276 2, 250
Nebraska Kansas	700 1, 428	850 1, 925	470 820	650 1, 310	396 601	2, 020	930 930	330 1, 347	90 540	270 804	150 396	330 1, 404
North Central	48, 430	24, 440	31, 980	23, 088	18, 723	52, 706		9, 555	11, 655	10, 014	9, 078	20, 307
Delaware Maryland Virginia West Virginia North Carolina South Carolina Georgia	2, 376 3, 500 19, 902 10, 875 5, 986 647 1, 827	1, 150 1, 700 6, 600 5, 000 1, 825 363 595	16, 100 8, 750 5, 010 480	911 2, 200 13, 054 5, 716 2, 628 180 650	1, 600 1, 650 7, 700 4, 306 2, 555 300 1, 126	1, 785 3, 582 21, 889 12, 954 5, 475 374 1, 500	1, 980 1, 800 11, 100 5, 100 1, 035	900 1, 200 4, 950 4, 050 273 	1, 290 1, 326 11, 100 4, 410 750	9, 300	1, 401 990 4, 350 2, 040 300	1, 200 1, 740 10, 500 4, 791 822
South Atlantic_	45, 113	17, 233	35, 480	25, 339	19, 237	47, 559	21, 471	11, 613	19, 227	16, 350	9, 408	19, 353
Kentucky	6, 408 5, 360 1, 328 324 3, 450 770 380	720 1, 152 328 152 1, 015 18 493 168	250 2, 200 30 350	1, 400 1, 375 437 140 1, 300 17 488 190	935 1, 300 608 160 1, 441 25 226 125	5, 390 3, 780 1, 100 272 4, 200 39 400 215	501 875 1, 500	75 81 609	456 264 1, 242	159 138 660 66	96 114 780 21	558 300 2,457 60
South Central	18, 055	4, 046	13, 421	5, 347	4,820	15, 396	2, 469	825	1, 995	1, 023	1, 011	3, 375
Montana	47	295 6, 000 40 2, 592 456 62 660	3,020 675 76	555 5, 350 56 2, 300 1, 138 84 610	505 5, 200 49 1, 060 448 74	434 5,000 24 2,090 1,089 97 400	2, 775 2, 775 2, 907 600 33 480	2, 253 360 30	450 4, 800 2, 700 507 24	2, 160 840 27	393 4, 650 1, 005 306 27	300 3, 969 1, 500 450 30
Nevada Washington Oregon California	34, 030 8, 036 10, 350	25, 343 4, 320 7, 458	83 500	29, 500	1, 100 50 37, 850 6, 200 11, 644	35	25, 950 5, 250		570 30, 000 5, 100 6, 861	24.687	945 33, 597 4, 470 6, 522	225 25, 200 2, 100 4, 647
Western United States	62, 635 246, 609		186 803	51, 313	,	<u> </u>		38, 607		39, 747	نے	38, 421
	-20,000	~~0, 080	100,080	100,022	100, 862	P11, 000	117, 384	18, 001	100, 883	80, 529	101, 004	104, 196

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Estimates of production for 1929 and 1930 revised on basis of 1930 census. Earlier years not so revised.

<sup>&</sup>lt;sup>1</sup>Included in "Total crop." By commercial crop is meant that portion of the total crop which is sold for consumption as fresh fruit.

\* Preliminary.

Table 179.—Apples: Car-lot shipments by State of origin, 1930-31 and 1931-39 and total United States shipments, 1923-24 to 1931-32 1

Ctata and anon						Crop-r	noven	ent s	eason	2				
State and crop season	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Δpr.	May	June	Total
EASTERN														
New England States: 1930-31	Cars	Cars	Cars 1	Cars 481	Cars 1, 177	Cars 1,072	Cars 327	Cars 146	Cars 40	Cars 28	Cars	Cars	Cars	Cars 3, 27
1931-32 New York:	<b>-</b>	<b></b>	2	363	357	31	5							
1930–31 1931–32 Pennsylvania:		29 5	493 121	1, 448 817	3, 642 1, 344	2, 875 988	1, 477 666	1, 878	1, 723 	1, 091	462	258	53 1	15, 42
1930-31 1931-32		39 26	51 24	234 173	961 1, 021	588 609	220 300	285	228	144	14			2, 70
Ilinois: 1930–31 1931–32	257 253	339 679	256 183	1, 080 969	1, 198 1, 717	66 486			22	41	32	27		3, 3
Michigan: 1930–31 1931–32		29 4	270 90	450 327	983 1, 343	116 673			3	2		1		1, 8
Missouri: 1930–31 1931–82	6	45 27	62 54	179 312	148 479			4	17	35	5	6		5
Delaware: 1930–31 1931–32	25	732 404	65 18	110 47	290 186		19	ļ	19	2				1,3
Maryland: 1930-31 1931-32	16		44 58	221 263	607 815				8	6				1, 3
Virginia: 1930-31 1931-32		89 124		931	2, 967	1. 180	538	604	493	848	111	39	26	7, 4
West Virginia: 1930-31 1931-32	3	95	95		1,690	585	92	110	87	35	16	1		3, 8
Arkansas: 1930–31 1931–32	15	21	110	32	122	11	9	l e	2	3				8
Other Eastern: 1930-31 1931-32	66	293	209	456	588	152	48	66	73	122	20	25	11	2, 1
Total Eastern: 1930-31 1931-32	1	1, 915 1, 700	1			1	1	1	2, 715	1, 857	666	357	91	43,
Western	998	1, 700	1,003	7,037	17,00	0,02	10,010	<u>'</u>						
Idaho: 1930-31 1931-32		2	1	1, 031 1, 179	3, 242 1, 964	1, 056 693	650		298	111	55	6		6,
Colorado: 1930-31 1931-32				10 70	639				26	10	,			1,
Washington: 1930-31 1931-32		56	391 257	4, 470 3, 479	13, 867 8, 359	7, 393	3, 998 3, <b>24</b> 2	3, 752	3, 763	3, 381	2, 036	1,456	654	45,
Oregon: 1930-31 1931-32	ļ	7	44	306 181	2, 400	1, 357	473		249	226	161	96	25	5,
California: 1930-31 1931-32	82	1, 347 1, 388	695	1, 092	1, 28	47	157	161	173	164	174	156	42	5,
Other Western: 1930-31 1931-32			67	256	1,046	233	49	18	12	4	ı	j		1,
Fotal Western: 1930-31 1931-82	32	1, 412 1, 435	1, 198	7, 165	1	10. 76		1	4, 521	3, 896	2, 430	1,714	72	66,
Total: 1923–24	l .	3, 360 2, 362	4, 122	16, 689	49, 876	26, 57	8, 061	8, 299	8, 213	6, 370	3, 469 2, 294	1 1 615	5 5 TK	138,
1924-25 1925-26 1926-27 1927-28	260	3, 840	4, 330 3, 387	14, 641 20, 905 20, 950	44, 89 45, 32	20, 08, 23, 25	7, 372 8, 365	6, 253 7, 969	6, 855 8, 020	6, 228 5, 348	4, 114 3, 596	2, 494 2, 355	941 888	127, 133, 93,
1928-29 1929-80	253	1, 815 3, 452	8, 539 4, 330 3, 791	14, 641 20, 905 20, 950 12, 106 19, 405 13, 996 13, 359	45, 90 37, 68	19, 774 14, 649	18, 309 15, 982	7, 774 6, 223	7, 749 6, 397	8, 500 5, 418 8, 217	2, 944 3, 662	1,710	686	127, 102
1930-31 1931-32	420	2, 022 3, 327 3, 135	2, 930 1, 969	13, 359 12, 790	30, 000	17, 751 14, 27	16, 28 7, 24	7, 948	7, 236	5, 753	8, 096	2,071	816	109,

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis. See preceding Yearbooks for data for earlier years.

<sup>&</sup>lt;sup>1</sup> Beginning January, 1931, figures a e subject to revision.
<sup>2</sup> Orop movement season extends from June of one year through June of the following year.

# Table 180 .- Apples: Cold-storage holdings, 1922-1931

## BARRELS 1

Year	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	Oct. 1	Nov. 1	Dec. 1
1922 1923 1924 1924 1925 1926 1927 1928 1929 1930	1,000 barrels 1,742 3,708 4,512 3,254 3,855 4,077 1,699 2,354 1,762 1,187	1,000 barrels 1,424 2,839 3,634 2,498 3,157 3,178 1,266 1,678 1,316 834	1,000 barrels 996 2,013 2,755 1,803 2,288 2,152 846 1,128 897 482	1,000 barrels 561 1, 199 1, 768 1, 046 1, 307 1, 286 501 652 481 200	1,000 barrels 248 578 1,044 504 617 650 262 319 229 86	1,000 barrels 74 150 430 165 221 229 121 108 96 38	1,000 barrels 1, 219 584 479 885 484 449 652 735 500 398	1,000 barrels 4,133 4,226 3,172 3,749 3,188 1,864 2,978 2,189 1,571 2,285	1,000 barrels 4, 319 5, 010 3, 709 4, 245 4, 554 2, 055 2, 889 2, 097 1, 456 2, 177

### BUSHEL BASKETS 2

1923	1,000 baskets	1,000 baskets	1,000 baskets	1,000 baskets	1,000 baskets	1,000 baskets	1,000 baskets 241	1,000 baskets 1,179	1,000 baskets 1,400
1924	1, 351	1,078	808	471	208	64	193	1, 138	1, 374
1925	1, 167	940	608	314	117	29	519	2, 056	2, 419
1926	2, 103	1,672	1,138	672	329	124	352	2, 235	2, 713
1927	2, 472	2,037	1,589	952	533	199	724	3, 309	3, 905
1927	3, 177	2,315	1,536	900	460	222	1, 084	4, 932	5, 057
1928	4, 240	3,204	2,171	1,308	590	220	1, 793	6, 379	6, 613
1920	5, 507	4,005	2,805	1,555	763	309	1, 982	6, 748	6, 946
1930	5, 996	4,469	2,855	1,300	571	193	2, 032	9, 787	10, 817

### BOXES

1922 1923 1924 1925 1926 1927 1927 1928 1929 1930	1,000 baxes 11,061 8,310 14,201 9,089 11,868 13,365 12,200 15,853 13,108	1,000 bares 8,667 7,612 11,550 7,264 10,009 10,435 9,809 12,388 10,149 15,347	1,000 botes 6,282 5,593 8,821 5,266 7,898 7,298 7,023 7,995 7,282 11,371	1,000 bares 4, 107 3, 345 5, 837 3, 412 5, 350 4, 613 4, 960 4, 889 4, 790 6, 852	1,000 boxes 2,088 1,475 2,901 1,801 2,892 2,312 2,889 2,224 2,446 3,683	1,000 boxes 721 380 949 674 1,104 717 1,223 631 761 1,425	1,000 boxes 669 789 829 1,091 1,809 1,043 1,854 901 2,135 3,203	1,000 boxes 4,164 6,886 6,620 9,165 9,523 9,074 12,333 11,045 15,669 15,472	1,000 boxes 7, 271 13, 860 9, 917 13, 041 15, 083 13, 423 17, 452 15, 235 21, 267 16, 849
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## TOTAL, IN BUSHELS 3

Bureau of Agricultural Economics. Compiled from reports made by cold-storage establishments.

<sup>&</sup>lt;sup>1</sup>Previous to Oct. 1, 1923, apples packed in bushel baskets are included in this tabulation on a basis of 3 bushels to the barrel.

<sup>2</sup> Prior to Oct. 1, 1923, included with barreled apples.

<sup>3</sup> 1 barrel is considered the equivalent of 3 boxes or 3 bushel baskets.

Table 181.—Apples: 1 International trade, average 1925-1929, annual 1927-1930

					Calend	ar year				
Country	A verag		19	27	19	28	19:	29	19	30 3
	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports
PRINCIPAL EXPORTING COUNTRIES United States Canada Australia 3 France 4 Italy Netherlands Belgium Rumania Yugoslavia New Zealand Total PRINCIPAL IMPORTING	3, 626 2, 161 1, 880 1, 597 1, 309 1, 122 5 784 783 565	1,000 bush. 137 542 0 638 1 422 303 8 0 8 2 31	1,316 1,729 1,659 1,462 1,301 4 509 719 441	631 0 491 0 401 361 10	773 463 814	633 0 615 1 391 274 0 21	4, 665 1, 342 422 1, 906 1, 738 1, 105 1, 125 789	440 0 1, 534 1 557 405	1, 908 448 1, 005 2, 6\$8 1, 072	3 778 705 2 27
CCUNTRIES United Kingdom Germany Sweden Denmark Irish Free State Egypt Norway Finland Cuba Poland	34 0 0 0 2 0 0 0 0 0	178 96 88	31 0 0 0 2 0 0 0 0 0	449 366 249 128 161 130 80	17 0 0 0 3 3 0 0 0 0 0	9, 777 874 638 441 345 186 214 210 94	38 0 0 0 3 0 0 0 0 7	7, 501 998 825 441 487 219 268 218 78 274	40 150 0 41 0 0 0 0 150	683 689 449 360 169 114 166 80 484
Total	54	25, 703	41	24, 615	45	26, 229	48	24, 141	341	27,972

Bureau of Agricultural Economics. Official sources.

Table 182.—Apples: Estimated average price per bushel received by producers, United States, 1922-23 to 1931-32

Crop year	June 15	July 15	Aug. 15	Sept 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	Мау 15	Weight- ed aver- age
1922-23 1923-24 1924-25 1924-25 1925-27 1927-23 1929-30 1920-30 1930-31 1931-32	Cents 202. 7 188. 6 159. 3 201. 4 168. 7 140. 0 188. 7 153. 1 173. 6 131. 5	181. 7 166. 7 141. 3 158. 7 133. 8 144. 4 156. 0 160. 5 144. 8	100. 4 121. 4 121. 6 130. 7 103. 8 135. 8 105. 5 138. 9 106. 3	94.3 108.0 109.8 112.5 88.4 130.7 96.6 131.0 103.2	93. 4 114. 0 115. 9 120. 5 80. 2 134. 7 99. 4 137. 9	114.6 119.5 127.7 81.6 141.8 107.9 135.6 96.7	108. 6 114. 0 128. 2 137. 4 87. 7 152. 4 118. 5 143. 4 98. 8	131. 5 121. 3 144. 9 146. 3 97. 3 161. 7 124. 1 148. 3	142.3 125.0 150.7 146.3 98.8 168.3 129.9 154.0	129. 1 155. 4 139. 8 100. 0 177. 0 134. 1 155. 2	156.5 129.4 158.4 143.2 103.8 183.3 133.5 159.9	178. 7 131. 3 179. 2 148. 2 113. 5 190. 6 147. 9 168. 2	122. 1 127. 0 88. 3 141. 7 110. 3 141. 4

Bureau of Agricultural Economics. Based upon returns from special price reporters. Monthly prices by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by car-lot shipments.

Table 183.—Apricots: Production and value, California, 1922-1931

Year	Produc- tion	Sea- sonal farm price	Farm value	Year	Produc- tion	Sea- sonal farm price	Farm value
1922 1923 1924 1925 1926	Short tons 145, 000 210, 000 142, 000 150, 000 176, 000	Dollars 70.00 25.00 46.00 54.00 63.00	1,000 dolls. 10,150 5,250 6,532 8,100 11,088	1927 1928 1929 1930 1931	Shortions 208,000 175,000 215,000 1 200,000 1 245,000	Dollars 57. 00 50. 00 63. 00 39. 00 3 29. 00	1,000 dolls. 11, 856 8, 750 13, 545 7, 476 6, 989

Bureau of Agricultural Economics.

<sup>&</sup>lt;sup>1</sup> Foreign weights are converted to bushels on the basis of 48 pounds per bushel; domestic, 1 barrel equals 3 boxes (or bushels). <sup>2</sup> Preliminary. <sup>3</sup> Year ended June 30. <sup>4</sup> Includes pears. <sup>5</sup> 3-year average.

<sup>&</sup>lt;sup>1</sup> Includes some fruit not harvested on account of market conditions (but not included in computing value), as follows: 1830, 8,300 tons; 1931, 4,000 tons.

<sup>2</sup> Preliminary.

<sup>3</sup> Seasonal average price to Dec. 1.

Table 184 .- Asparagus, commercial crop: Acreage, production, and price per crate or ton, 1928-1931

		Acr	eage			Produ	iction		Sea	sonal f	arm pi	ice
Utilization	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
	49, 620		52, 890	63, 940	Tons 2	1,000 crates 1 3,446	Tons 2	Tons 2	2 44	2. 71		2.01
For manufacture	39, 550	45, 760	44, 670	38, 840	62, 900	72, 310	72, 160	48, 290	79. 40	81. 91	81. 17	75. 25
Total	89, 170	92, 160	97, 560	102,780	1,000 crates 9, 199	1,000 crates 9,472	1,000 crates 10, 524	1,000 crates 9,307	1. 59	1. 61	1. 58	1. 55

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters and canning establishments

2 Short tons.

Table 185 .- Beans, snap, commercial crop: Acreage, production, and price per bushel or ton, 1928-1931

		Acr	eage			Prod	uction		Bee	sonal f	arm p	ice
Utilization	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
For market	Acres 96, 180	Acres 94, 380		Acres 114, 000	1,000 bush.1 7,370	1,000 bush. <sup>1</sup> 8,937	1,000 bush.1 2 10, 298	1,000 bush.1 29,615		Dolls. 1. 63		
For manufacture.	45, 640	65, 040	78, 690	54, 110			Tons 3 90, 400	Tons 8 69, 100	61. 24	62. 70	62.15	53. 69
Total	141, 820	159, 420	189, 270	168, 110	158, 640	199, 540	<sup>2</sup> 213, 980	<sup>2</sup> 184, 480	106.83	101. 84	92, 16	87.42

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters and canning establishments.

Table 186.—Beans, snap: Car-lot shipments, by State of origin, 1920-1931

					1	Calenda	ar year					
STATE	1920	1921	1922	1923	1924	1925	1926	1927	1928	1920	1930	1931 1
New York New Jersey Maryland Virginia North Carolina South Carolina Georgia Florida 3 Tennessee Mississippi Arkansas Louisiana Teras Colorado California Other States	Cars 43 90 159 155 133 142 6 6 07 20 105 2 35 7	Cars 28 111 22 79 128 331 26 367 27 202 39 60 65	Cars 11 68 149 208 219 503 65 715 63 252 1 90 26 2 20 144	Cars 33 15 49 101 261 585 26 1, 644 81 47 2 107 88	Cars 81 100 136 899 559 517 68 1, 157 248 85 7 439 210	Cars 62 48 127 570 459 834 27 1, 992 84 88 13 683 407 5 118 116	Cars 39 56 197 841 550 449 51 946 174 138 588 414	Cars 31 203 235 877 504 425 96 2,583 45 143 18 662 471 5 60 123	Cars 49 110 246 657 690 439 48 2,700 119 192 69 822 294 3 116 132	Cars 69 61 214 1, 025 736 779 152 3, 254 132 92 1, 156 358 77 163	Cars 30 114 852 541 908 682 230 4, 118 233 310 744 654 119 139	Cars 101 129 479 591 710 703 171 4,319 83 209 88 852 606 76 93 154
Total	1, 533	1, 560	2, 598	3, 124	4, 682	5, 133	4, 706	6, 481	6, 686	8, 626	9, 559	9, 314

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis. Beginning 1931 figures include lima beans in pod.

<sup>1</sup> Crates containing approximately 24 pounds.

<sup>&</sup>lt;sup>1</sup> Bushels containing approximately 24 pounds.

<sup>1</sup> Includes some quantities not harvested on account of market conditions. Price refers to harvested portion of crop.

<sup>3</sup> Short ton.

<sup>&</sup>lt;sup>1</sup> Preliminary.

<sup>2</sup> Figures for Florida include cars moved in preceding calendar year, as follows: 1920, 35 cars in November and 87 in December; 1921, 11 cars in November and 1 in December; 1922, 26 cars in November and 26 in December; 1923, 41 cars in November and 46 inDecember; 1924, 1 car in October, 76 in November, and 215 in December; 1923, 73 cars in November and 154 in December; 1924, 1 car in October, 177 in November, and 240 in December; 1927, 14 cars in October, 182 in November, and 300 in December, 1928, 29 cars in October, 710 in November, and 547 in December; 1929, 3 cars in October, 160 in November, and 203 in December; 1939, 9 cars in October, 293 in November, and 603 in December; 1931, 224 cars in October, 1,019 in November, and 333 in December.

Table 187.—Cabbage, commercial crop: Acreage, production, and price per ton, by States, 1928-1931

## FOR MARKET AND SAUERKRAUT

		Acre	age			Produ	etion		Seas to ]	onal f Dec. 1	arm p	rice
Group and State	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
Fall: South Carolina Virginia, Nor-	Acres 600	Acres 350	Acres 750	Acres 900	Tons 1 2, 400	Tons 1 2, 900	Tons 1 9, 400	Tons 1 9,000	Dols. 46. 75	Dols. 68. 50	Dols. 36. 00	Dols. 41.76
folk	180	180	300	100	900	1, 100	1, 300	100	71.08	50.00	35. 00	43. 50
Group total	780	530	1,050	1,000	3,300	4,000	10,700	9, 100	53. 33	63. 50	35. 89	41.76
Early: <sup>2</sup> California Florida Louisiana, win-	4, 850 2, 900	4, 600 6, 500	4, 050 3, 700	4, 400 6, 500	16,000	24,800 39,000	25, 500	<sup>3</sup> 26, 000 <sup>8</sup> 48, 100	36. 93	33. 60	63. 20	22.40
ter Texas	3, 700 15, 840	3, 500 20, 400	3,000 . 18,000	2,800 26,900	21, 100 91, 900	16, 400 118, 300	9, 900 82, 800	11,500 3 161,400	23. 09 19. 18	22. 10 13. 58	35. 78 46. 38	16. 60 5. 60
Group total	27, 290	35, 000	28, 750	40,600	158, 600			<sup>8</sup> 247, 000				
Second early: Alabama Georgia Mississippi North Carolina. South Oarolina.	2, 200 100 2, 700 680	2, 050 720 3, 600 850 3, 300	1, 550 410 2, 850 800	1, 950 400 3, 100 700 3, 000	10,800 300 14,800 3,400	10, 200 3, 600 20, 500 6, 000 29, 000	7,800 3,000 12,800 4,800	13, 300	62. 62 30. 60	20. 00 20. 00	45.00 35.00	14.00 15.00
Virginia	2, 500 4, 900	4,800	3, 100 4, 750	4, 150	15,500 17,200	37, 600	31,000 20,200	<sup>3</sup> 18, 400	33. 72	25. 37	28.4	18. 92
Eastern Shore_ Norfolk	1, 500 3, 400	1, 900 2, 900	1, 250 3, 500	1,000 3,150	7,000 10,200	17, 500 20, 300	6, 200 14, 000	5, 200 18, 200	27. 58 37. 97	20. 00 30. 00	25. 00 30. 00	18. 80 19. 00
Group total	13, 080	15, 320	13, 460	13, 300	62,000	107, 100	79, 600	<sup>3</sup> 85, 300	46. 45	35. 27	38. 1	15. 21
Intermediate: Arkansas Delaware Illinois Iowa Kentucky Maryland Missouri New Jersey New Mexico New York, Long Island Ohlo, southeast Tennessee Virginia, south west Washington Group total Late (domestio): Colorado Indiana Michigan Minnesota New York Ohlo Oregon Pennsylvania Utah Wisconsin	450 250 1, 700 1, 480 2,000 2,000 500 3, 090 2, 120 2, 700 1, 950 22, 300 1, 300 1, 510 2, 820 2, 910 8, 960 2, 610 8, 960	400 400 1, 650 1, 650 2, 320 3, 020 3, 020 3, 020 2, 000 24, 140 1, 400 1, 960 2, 980 1, 050 9, 980 1, 100 1, 100	450 2,320 2,320 2,000 140 2,500 4,800 4,800 2,930 2,730 2,600 24,520 1,700 23,500 3,780 1,210 11,750 3,580 1,180 1,180	500 250 2,090 1,400 1,780 988 4,100 2,980 1,050 2,200 2,460 2,050 22,220 22,220 1,600 1,18	2, 000 1, 400 15, 500 13, 300 1, 600 12, 800 23, 200 27, 200 8, 500 14, 900 14, 900 188, 100 188, 100 188, 100 27, 200 11, 900 27, 200 11, 900 11, 900	1,000 1,700 16,100 10,600 22,500 6,400 22,500 6,400 17,700 17,500 172,000 12,20	1, 100 1, 200 20, 000 12, 400 10, 200 6, 100 26, 900 3, 400 18, 800 18, 800 153, 200 19, 000 94, 000 19, 000 94, 000 19, 400	2, 500 1, 600 12, 500 7, 100 1, 400 9, 600 5, 100 26, 200 1, 800 10, 600 14, 800 18, 400 11, 800 11, 8	14. 00 40. 00 41. 00 41. 00 41. 00 11. 30 11. 30 11. 30 11. 22 40 11. 30 10. 10 11. 20 10. 10 10. 4 10. 9 10. 9 10	) 12, 50 5 19, 77 5 22, 8 5 10, 30, 00 10, 10, 10, 10, 10, 10, 10, 10, 10, 10,	0 22. 50 50 50 50 50 50 50 50 50 50 50 50 50	0 13. 00 0 14. 65 1 16. 15 1 16. 15 1 11. 70 0 20. 00 0 14. 27 2 17. 50 0 20. 40 0 15. 00 0 18. 00 5 19. 00 5 16. 65 7 9. 93 5 13. 00
Group total	28, 820	33, 470	42, 610	33, 710	263, 800	279, 000	324, 000	236, 400	13. 3	6 12. 8	1 9 2	1 8 17
Late (Danish): Colorado Indiana Michigan Michigan Minnesota New York Ohio Pennsylvania Wisconsin Group total	350 1, 590 19, 170 430 550 6, 750	200 360 2,450 19,640 430 670 8,640	1, 960 20, 920 450 710 11, 180	350 600 1, 650 21, 550 420 700 7, 430	3,000 16,100 134,200 3,000 3,800	1, 800 2, 500 13, 500 157, 100 3, 000 4, 700 67, 400	1,800 3,900 9,400	2, 600 3, 900 6, 600 183, 200 3, 200 5, 600 36, 400	19. 2 16 9 25. 7 26. 6 29. 0	19. 0 5 21. 7 6 22. 5 9 16. 8 1 14. 8 8 20. 0 0 17. 9	0 18. 0 0 14. 2 9 11. 6 6 10. 0 5 11. 9 0 10. 8 3 6. 4	

Short ton.
 Season begins in fall of previous year.
 Includes some quantities not harvested on account of market conditions. Price refers to harvested portion of crop.

Table 187.—Cabbage, commercial crop: Acreage, production, and price per ton, by States, 1928-1931—Continued

### FOR MARKET AND SAUERKRAUT

Group and State		Acre	age			Produ	iction		Seas to	onal f Dec. 1	arm p , per	rice ton
Group and State	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
Late (total): Colorado Indiana Michigan Michigan Minnesota New York Ohio Oregon Pennsylvania Utah Wisconsin	Acres 2, 900 1, 510 3, 170 2, 500 28, 130 3, 040 1, 550 1, 660 360 14, 440	2, 160 3, 320 3, 500 29, 620 3, 330 1, 600 1, 790 300	2,700 4,380 3,170 32,670 4,030 1,630 1,890 630	2, 710 3, 920 2, 800 31, 550 3, 090 1, 600 1, 830	15, 700 26, 400 25, 900 203, 200 25, 700 13, 200 12, 800	20, 900 21, 700 254, 900 27, 900 8, 000 15, 900 4, 000	16, 800 26, 600 18, 400 248, 800 23, 700 13, 000 14, 000	31,600 17,900 25,500 11,900 263,200 27,000 14,400 14,300 8,800	12. 24 10. 45 10. 38 13. 78 23. 26 11. 25 29. 88 24. 06 14. 44	12. 76 11. 24 17. 37 15. 71 8. 49 18. 00 17. 74 15. 40	8. 62 10. 18 9. 02 11. 20 9. 60 8. 31 15. 00 17. 93 5. 90	14, 84 12, 40 6, 63 11, 51 5, 95 6 59 12, 50
Group total	59, 260	67,760	80, 980	68, 610	519, 500	553, 400	614, 900	497,700		·		
Miscellaneous	50	70	230	280	400	600	1, 300	1, 200	7. 50	8. 33	11. 54	10.00
Total, all States	122, 760	142, 820	148, 990	146, 010	911, 900	1, 034, 000	998, 600	<sup>8</sup> 992, 800	21. 22	18. 51	18. 62	10. 03

### FOR MARKET

Fall	780	530	1,050	1,000	3, 300	4,000	10, 700	9, 100	53. 33	63, 50	35. 89	41.76
	27, 290	35,000	28, 750		158, 600	198, 500		3 247, 000	23.68	19.14	45, 96	8, 36
	13, 080	15, 320	13, 460	13,300		107, 100	79, 600	3 85, 300	46, 48	25, 27	38, 12	12. 25
Intermediate:	-0,000	,	,	,	0-, 000		,	.,				
Illinois	1, 030	1, 220	1,520	1,540	9, 300	11, 100	13, 800	10,900	10, 65	21.80	19. 28	16. 97
Iowa.	1, 300	1, 330	1, 200	1,100	11,600	7, 600		6, 200	17. 07	27.50	17. 22	12.42
Tennessee	1,870	2,640	2, 130	1,850	11, 400	15, 800	13, 700	7, 600	14, 65	21.65	32.92	19, 21
Virginia	2, 200	2, 200	2, 200	2, 160	22, 000	14, 500		13,000	18, 00	38. 14	18, 46	10. 15
Washington	1, 690	1, 680	1,680	1,850		14, 300	15, 900	16,700	19, 07	10.98	15, 85	12.99
Other States	12, 320	12, 920	12, 700	11,900	85, 200	92,600		<sup>8</sup> 88, 200	23, 24	24, 45	22, 79	17. 80
ļ									$\overline{}$			
Total	20, 410	21, 990	21, 430	20, 400	151, 300	155, 900	134, 400	<sup>8</sup> 142, 600	20. 26	24.16	22.08	16. 32
Domestic (late):										_		
Colorado	800	900	1, 200	1,350	11, 200	7, 200	13, 200	9,400	11. 07	26.94	10. 38	20 96
Indiana	780	880	950	1,100	8, 400	6,800	6,000			15.44		
Michigan	1, 200		1,750	1,900	10,400	7,700	9, 300	10,800				
Minnesota	480	550	670	770	5, 200	4, 200	4,800					15 33
New York	4,710	5, 680		5,000		54, 400	33, 200	35, 800	23. 44	16, 45	13, 19	7.79
Ohio (other)	360	200	280	470		1,700	1,700					7.55
Oregon	1, 450	1,560	1,590	1,570		7,800	12,600		30.65	18, 08	15. 00	12.48
Pennsylvania.	910	920	930	930				6,800	24, 46	18.48	25, 28	11.18
Utah	270	130	460	280		2, 200		3,600	15, 56	20.91	5, 00	16.39
Wisconsin	3, 090	4,700				34, 300						
i-												
Total	14,650	16, 780	19, 900	17, 840	135, 400	100, 000	145, 900	120,600	17.49	10.00	11. 30	10. 02
Danish (late):												
	18, 020			20,750	126, 100	143, 500	141, 800		26. 64	17.46	10.35	5.83
Other States	11, 270	14, 650	17, 450	13, 350	121,600	115, 700	136, 100	78, 100	18. 75	18.89	7.79	10.74
Total	29, 290	82, 500	36, 650	84 100	247, 700	250 200	277, 900	254, 500	22 77	18 10	9 10	7 24
10001	20, 200	02, 000	20,000	04, 100	221, 100	200, 200	277, 500	202,000	24. 11	10. 10	8. IU	7.02
Late (total)	43, 940	49, 370	56, 550	52,040	383, 100	394, 700	423, 800	375, 100	20, 90	17.40	9, 85	8.36
				, 010			, 000					
Total market_1	105, 500	122, 210	121, 240	127, 340	758, 300	860, 200	787, 400	\$ 859, 100	23. 59	20.22	21. 52	10.42

#### FOR SAUERKRAUT

New York Ohio Indiana Illinois	5, 400 2, 250 730 670	6,000 2,700 1,080 670	1, 400 800	5, 800 2, 200 1, 200 550	7, 800 6, 200	23, 200 5, 900 5, 000	19, 100 9, 000 6, 200	51,000 18,900 6,300 1,600	7. 10	7. 15 7. 85	7. 20 7. 30	5.60 7.10
Michigan Wisconsin Minnesota	1, 620 4, 000 430	1,700 5,500 500	2, 030 7, 200 540	1, 420 5, 000 380	13,000 41,200 4,600	10.700 47,300 4.000	13, 400 61, 200 4, 200	10, 800 28, 500 2, 300	7. 20 8. 20 7. 00	7. 90 1. 00 7. 00	7. 35 8. 50 7. 00	5.80 6.20 6.70
Colorado Washington Other States 4	500 260 1, 400	320 1,640		200 1, 610	12,000	2, 900 12, 800	2,900			l 1. 00 l 1. 13	15. 00 10. 35	12.80
U.S. total	17, 260	20, 610	27, 750	18,670	153, 600	173, 800	211, 200	133, 700	9. 54	10. 21	7. 77	6.03

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters and sauerkraut manufacturers.

<sup>\*</sup>Short ton.

\*Season begins in fall of previous year.

\*Season begins in fall of previous year.

\*Includes some quantities not harvested on account of market conditions. Price refers to harvested portion of crop.

\*Other States include Arkansas, California, Iowa, Maryland, Montana, Missouri, Nebraska, Oregon, Pennsylvania, Tennessee, Utah, and Virginia.

Table 188.—Cabbage: Car-lot shipments, by State of origin, 1920-1930

State				Cı	rop-mov	ement	season 1				
	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	19302
New York 8	219 1, 545 49 904 4, 581 112 136 879 878 254 5, 180	1, 617 103 181 1, 001 509 313 1, 847 2, 523 170	Care 10, 274 408 589 144 9875 1, 192 566 448 2, 937 73 563 1, 364 1, 364 1, 964 1, 964 1, 964 1, 964 1, 964	989 390 2,306 4,299 1,172 85 270 1,584 1,134 456 1,356 3,174 684	103 7, 281 1, 473	1, 936 45 317 1, 270 674 644 4, 048 1, 432 103 650	459 166 1, 814 2, 671 1, 667 17, 609 1, 586 331 6, 093 1, 274 154 603	Cars 14, 080 4200 7655 193 3, 547, 1, 009 4355 293 2, 7200 1, 051 292 1, 900 1, 051 667 1, 863 710 592 5, 546 683 139 360 727	1, 168 33 823 861 1, 249 592 7, 242 1, 162 82	7, 905 810 168 512	216 66 355 153 5, 939 683 504 67 1, 772 214 2, 731 2, 271 255 676 931 265 5, 347 1, 164 857
Total	35, 096	30, 927	41, 229	37, 488	42,081	39, 024	40, 378	39, 331	38, 727	44, 131	38, 204

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

Table 189.—Cantaloupes: 1 Car-lot shipments, by State of origin, 1920-1931

<u> </u>					Crop-	moven	nent se	ason 1				
State	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	19318
Indiana Michigan Delaware Maryland North Carolina South Carolina South Carolina Georgia Arkansas Texas Colorado New Mexico Arizona Washington California do ther States Other States	Cars 632 209 600 781 358 131 387 986 169 2, 482 1, 159 380 13, 251	232 942 1, 153 89- 283 1, 554 1, 554 3, 288 508 1, 504 208 13, 166	465 648 3 1, 233 4 700 270 9 1, 632 1, 002 8 1, 002 8 4, 420 8 275 1, 558 8 71 15, 304	306 818 1, 270 620 70 217 337 387 2, 306 1, 208 207 16, 486	114 511 699 401 116 586 1, 052 456 3, 229 518 2, 145 2, 145 298	146 657 1, 116 655 83 117 1, 245 498 3, 837 574 3, 833 221 18, 707	84 551 1, 283 401 173 186 1, 127 514 5, 108 640 8, 712 145 18, 820	77 427 1, 159 606 179 108 788 242 3, 980 415 5, 217 252 22, 406	52 427 1, 002 304 94 104 854 2, 789 370 5, 901 258 25, 307	16 285 561 88 44 76 413 176 4, 664 352 5, 457 382 26, 850	13 193 274 19 125 138 245 358 4, 088 416 5, 834 282 283, 626	16 233 335 110 89 83 446 753 2,778 612 4,542 150 25,673
Total	22, 953	25, 81	29, 930	25, 923	31, 494	33, 819	33, 424	36, 757	38, 694	40, 042	36, 179	36, 520

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in ear lots include those by boat reduced to car-lot basis.

<sup>1</sup> Crop-movement season covers 17 months, from December through the second following April; i. e., the 1920 season begins December, 1919, and ends April, 1921.

<sup>1920</sup> season begins December, 1919, and ends April, 1921.

2 Prelimnary,

3 Frigures include shipments in May of succeeding crop year as follows: N. Y., 1922, 1 car; 1926, 3 cars; 1927, 25 cars; 1930, 1 car; Pa., 1920, 1 car; Mich., 1927, 1 car; 1928, 2 cars.

4 Figures include shipments in November of preceding crop year as follows: Virginia, 1922, 1 car; 1925, 7 cars; 1928, 1 car; 1930, 11 cars; South Carolina, 1922, 1 car; 1923, 11 cars; 1924, 24 cars; 1925, 8 cars; 1927, 10 cars; 1928, 23 cars; 1929, 3 cars; 1930, 130 cars; Florida, 1928, 5 cars; Louisiana, 1923, 2 cars; 1924, 1 car; Texas, 1920, 2 cars; 1922, 4 cars; 1923, 22 cars; 1924, 9 cars; 1925, 12 cars; 1928, 30 cars; 1929, 12 cars; 1930, 10 cars; Oalifornia, 1920, 24 cars; 1921, 6 cars; 1922, 64 cars; 1923, 1 car; 1924, 2 cars; 1926, 2 cars; 1930, 1 car.

<sup>&</sup>lt;sup>1</sup> Includes Honeydew and other miscellaneous melons. Melons other than cantaloupes were not reported separately until 1923. Shipments are as follows: 1923, 1,152 cars; 1924, 2,555 cars; 1925, 3,654 cars; 1926, 6,484 cars; 1927, 6,516 cars; 1928, 9,719 cars; 1929, 11,894 cars; 1930, 12,352 cars; 1931, 12,169 cars.

<sup>3</sup> Orop-movement season extends from Apr. 1 through November of a given year.

<sup>3</sup> Preliminary.

<sup>4</sup> Figures for California include shipments in December as follows: 1920, 1 car; 1925, 18 cars; 1926, 3 cars; 1927, 4 cars; 1928, 2 cars; 1930, 1 car.

Table 190 .- Cantaloupes,1 commercial crop: Acreage, production, and price per crate, by States, 1928-1931

		Acre	age			Produ	ıction		Seaso	nal far		e per
Group and State	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
Early: Oalifornia (Imperial)	Acres 33, 460 920 140	Acres 38, 360 600 740	Acres 50, 900 600 1, 260	51, 640 250 540	1,000 crates² 6, 224 87 16	6, 713 36 70	1,000 crates <sup>2</sup> 5, 752 30 113	7, 849 13 59	Dolls. 1. 60 2. 00 1. 20	1. 63 2. 00 2. 00	Dolls. 1. 32 1. 75 2. 25	Dolls. 1. 14 1. 50 . 81
Group total	34, 520	39, 700	52, 760	52, 430	6, 277	6, 819	5, 895	7, 921	1. 60	1.64	1.84	1. 14
Second early: Arizona Arkansas California (other) Georgia Novada North Carolina Oklahoma South Carolina Tevas (other)	650 250	2,400 14,020 600 170 1,000 500	15, 700 2, 550 15, 330 750 150 620 500 2, 320	13, 000 2, 600 15, 680 120 1, 100 1, 200 11, 530	564 2, 470 52 50 261 34 56		[ 115]	1, 625 182 2, 540 56 20 99 64 150 865	1. 34 1. 02 1. 06 1. 50 . 80 . 98 . 89 1. 31	1. 22 . 95 2. 22 1. 30 1. 20 1. 25 1. 90	1. 15 1. 10 . 75	.87 .75 .84 .70 .68
Group total	33, 970	32, 200	38, 520	46, 780	5, 428	5, 259	5, 445	<sup>8</sup> 5, 601	1. 13	1.10	. 95	. 84
Intermediate: Delaware. Ulinois. Indiana. Maryland New Mexico. Tennesseo. Washington.	6, 040 1, 400 470 1, 750	120 1,850	2, 400 900 4, 390 7, 010 1, 800 170 1, 950	1,600	97 524 676 189 33 192	578 196 10 278	63 255 386 243 13 224	317 82 438 734 258 15 197	1. 00 1. 20 1. 23 1. 21 1. 10 1. 05	1. 45 1. 50 1. 45 1. 00 1. 50	1. 75 1. 55 1. 55 1. 50 1. 60 1. 18	1. 25 1. 15 . 75 1. 17 1. 85 . 75
Group total	17, 600	17,820	18, 620	20, 460	2, 035	1,814	1, 328	2, 041	1.11	1.81	1. 50	. 91
Late: Colorado	780 450 3,000 220	580 450 3,400 320	520 450 3, 800 280 3, 100 360	4,000 4,000 4,000 4,000	78 57 300 36 480	89 54 476 40	42 40 608 44 388 41	53 50 560 3 420 57	1. 06 . 92 1. 38 1. 70	1. 48 2 .81 1. 35 1. 75	1. 40 1. 05 1. 60 1. 25 1. 25	1. 05 .80 1. 20 .65 1. 00 1. 09
Group total	16, 450	19, 150	19, 310	18, 510	2, 121	3, 501	8, 283	2, 399	1. 02	. 96	1. 25	. 96
Total all States.	102, 540	108, 870	129, 210	188, 180	15, 861	17, 393	15, 951	<sup>8</sup> 17, 962	1. 30	1. 31	1. 21	1. CO

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters.

Table 191 .- Carrots, commercial crop for market: Acreage, production, and price per bushel, 1928-1931

Marketing group		Acr	eage			Produ	ection		Seaso De	nal far ec. 1, p	m pri er busl	ce to
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
Fall Early Second early Intermediate Late Total	Acres 1, 840 6, 450 6, 270 2, 490 3, 070	2, 900 7, 540 8, 730 2, 200 5, 350	3, 950 7, 810 7, 650 2, 150 6, 390	4, 340 8, 230 10, 660 1, 710	861 1, 854 2, 154 525 1, 209	3 3, 514 538	1, 438 3, 093 2 706 8, 158	573 2,110	48 67 95 96	70 31 62 98 58	Cents 70 35 76 91 40	Cents 60 41 52 79 45

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters.

<sup>&</sup>lt;sup>1</sup> Includes Honeyball, Honeydew, Casaba, and Persian melons not separately reported.

<sup>2</sup> Standard crates (45's) containing approximately 60 pounds.

<sup>3</sup> Includes some quantities not harvested on account of market conditions. Price refers to harvested portion of crop.

Bushels containing approximately 50 pounds.
 Includes some quantities not harvested on account of market conditions. Price refers to harvested portion of crop.

Table 192 .- Carrots: Car-lot shipments by State of origin, 1920-1930

g				c	rop-mo	vement	season	1			
State	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930 2
New York New Jersey Illinois Michigan Virginia Mississippi Louisiana Texas Colorado California Other States	Cars 1, 158 32 53 11 3 77 28 5 1 111 123	Cars 1, 247 32 62 83 1 81 43 198 9 19	Cars 1, 523 26 82 25 10 304 62 48 4 21 151	Cars 1,410 34 24 35 2 142 59 65 12 24 173	Cars 2, 262 18 3 55 1 266 32 282 26 157 212	Cars 1, 825 48 23 54 40 197 106 575 29 278 252	Cars 1, 845 44 2 77 10 209 70 1, 136 62 557 290	Cars 2, 430 85 13 91 44 496 177 903 10 2, 363 241	Cars 1, 484 67 96 208 137 230 99 1, 685 216 2, 938 295	Cars 2, 111 12 33 204 110 108 71 2, 860 96 6, 095 449	Cars 1 2, 233 14 87 141 67 28 84 2, 145 43 7, 206
Total	1, 602	1,840	2, 256	1, 979	3, 314	3, 427	4, 302	6, 853	7, 455	12, 149	12, 437

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

Preliminary.
 Includes 45 cars in July, 1931.

Table 193.—Celery, commercial crop: Acreage, production, and price per crate, 1928-1931

Marketing group		Acr	eage			Produ	iction			nal fa		
TITUL ONLINE BLOOP	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
Fall and winter Early Second early Intermediate Late (sec. 1) Late (sec. 2)	Acres 7, 400 6, 580 450 3, 280 10, 140 1, 210	7,000 7,620 850 8,750 11,320	7, 620 7, 800 800 3, 210 13, 030	7, 060 7, 580 1, 100 2, 650 13, 330	999 2, 753 264 966	2, 877 604	616 882	1,000 crates 1 1,278 3,107 610 639 3,638 478	1. 09 2. 69 1. 94 1. 75	2. 14 2. 28 1. 72 1. 44	1. 00 2. 00 1. 60 1. 74 1. 12	1.04 2.37 1.86 1.75 1.68
Total	29, 060	31, 870	33, <del>94</del> 0	33, 350	8, 245	9, 418	10, 419	9, 750	1.88	1. 69	1. 46	1.82

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters.

Table 194.—Celery: Car-lot shipments, by State of origin, 1920-1930

Crop movement seeson 1

				01	ор-шо і	omeno s	Cason -				
State	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930 2
New York	Cars 3, 110 94 186 954 2, 652 22 805 16 2, 005 48	Cars 3, 047 219 224 1, 031 4, 218 9 211 53 3, 469 77	Cars 8, 247 115 212 1, 626 4, 954 26 222 82 2, 625 102	Cars 3, 742 219 223 1, 486 6, 398 49 125 205 4, 419 82	Cars 4,529 177 225 1,332 7,219 48 197 363 4,748 99	Cars 4, 492 149 208 2, 224 7, 952 29 398 4, 554 109	Cars 4, 898 138 194 1, 880 5, 504 19 211 511 6, 226 80	Care 5, 893 106 169 1, 997 7, 499 46 161 625 7, 696 125	Cars 4, 192 32 71 2, 139 8, 413 121 188 605 8, 384 135	53 105 1,852 8,831 262 149 673 9,580 138	Cars 5, 451 32 81 1, 606 9, 838 287 136 647 8, 480 69
Total	9, 392	12, 558	13, 211	16, 948	18, 937	20, 514	19, 661	24, 317	24, 280	25, 490	26, 627

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

¹ Crop-movement season begins in October of the previous year in such early shipping States as California, Louisiana, and Texas, and extends through June of the following year in order to include shipments from storage in Northern States and to have totals comparable with acreage and production figures.

<sup>1</sup> Two-thirds size (New York) grates containing approximately 90 pounds.

Crop movement season covers 20 months, from September through the second following April; i. e., the
 1920 season begins September, 1919, and ends April, 1921.
 Preliminary.

Table 195.—Cherries: Production in 10 States, imports, and exports 1924-1931

					P	roduct	lon					Impo ginn	rts, ye ing Ju	ar be- ıly 1	l, year
Year	New York	Michigan	Wisconsin	Montana	Idaho	Colorado	Utah	Washington	Oregon	California	10 States	Natural, in brine	Prepared or preserved	Total	Exports, canned, beginning July
	ž	×	<b>*</b>	M	PI	ပ	Б	<b>=</b>	5	Ö	2	Z	Æ	Ĕ	Ħ
1924 1925 1926 1927 1928 1929 1930 1931 ³	15, 300 16, 400 10, 500 9, 600 14, 670 25, 000	21, 500 15, 750 21, 100	3, 150 10, 250 4, 600 5, 200	385 350 130 720 560	2, 400 3, 200 1, 300 3, 100 3, 100 3, 200	4,500 1,650 5,100 3,500	3, 800 4, 600 3, 200 3, 500	10, 500 4, 100 9, 700 15, 550	15, 100 11, 300 11, 500 8, 500 12, 640	12,000 18,500 16,300	57, 800 90, 530 87, 490 108, 700	2, 904 5, 733 15, 136 13, 173 22, 362 7, 926	11, 153 15, 974 1, 048 384 866	1,000 lbs. 14, 112 14, 057 21, 707 16, 184 13, 557 23, 228 9, 206	1, 688 2, 111 1, 719 2, 202 1, 897

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board. Trade figures compiled from Monthly Summary of Foreign Trade of the United States, June issues. Estimates of production for 1929 and 1930 revised on basis of 1930 Census. Earlier years not so revised.

<sup>2</sup> Fresh cherries not separately reported.

Preliminary.

Table 196.—Citrus-fruit production, by States, 1899, 1909, 1919–1931 1

				0	ranges				G	rapefru	iit		Lem- ons	Limes	
Year	7 States	California	Florida 1	Texas	Arizons	Alabama 3	Louisiana	Mississippi	4 States	California	Florida 1	Texas	Arfzona	California	Florida
1919 1920 1921 1922 1922 1923 1924 1925 1926 1927 1928 1929 1930	22, 842 30, 005 20, 582 30, 671 37, 484 29, 847 33, 623 39, 229 31, 644 54, 160 34, 034	18, 100 24, 200 28, 167 23, 000 38, 705 24, 400 35, 000	4, 888 7, 400 8, 500 7, 700 10, 200 11, 600 9, 100 10, 700 8, 200	9 4 6 12 10 20 30 68 261 220	60 80 81 86 60 86 75 54 99 137	82 82 175 225 (5) 100 75 110 38 212	42 50 60 75 75 100 150 200 220 187 195	25 30 45 55 0 27 42 50 30 87	6, 095 5, 738 6, 795 8, 073 8, 893 9, 265 8, 190 8, 865	263 304 360 394 363 387 600 650 720 972 1,000	10, 500	35 65 211 200 340 490 772 1,530	34 35 44 65 67 90 75 176 211 365 400	7, 712 6, 000 7, 900 5, 900 7, 950	11 28  36 30 12 0 6 8 8

Bureau of Agricultural Economics. Estimates of production for 1929 and 1930 revised on basis of 1930 Census. Earlier years not so revised.

The prospects on Dec. 1, commercial shipments of Florida citrus fruits from the 1931 crop were estimated at 12,500,000 boxes of oranges, and 8,000,000 boxes of grapofruit, compared with 16,000,000 boxes of oranges and 11,200,000 boxes of grapefruit shipped from the 1930 crop.

§ For years 19,9–1931, equivalent in standard boxes, each equal to about 2 of the "half straps" commonly

used.

<sup>&</sup>lt;sup>1</sup> Estimates include only certain States where total production can be calculated from commercial sales (shipments, canning, cold pack, etc.) and differs from previously published commercial estimates for some States by an increased allowance for farm and local use.

<sup>&</sup>lt;sup>1</sup> The figures in this table of production include fruit consumed on farms, sold locally and used for manufacturing purposes, as well as that shipped. The figures do not include fruit which ripened on the trees, but which was destroyed by freezing or storms prior to picking. For California the figures relate to the crop produced from the bloom of the year shown, fruiting through the winter and through the spring and summer of the following year, being picked from Nov. 1 of the year shown to Oct. 31 of the following year. Fruit not picked until after the latter date is included with the crop of the following year. For all States except California the estimates include all fruit picked after about Sept. 1 of the year shown. The estimates for express include all fruit picked after about Sept. 1 of the year shown. mates for oranges include tangerines

Cansus. Size of boxes not specified.
5 500 boxes or less.

<sup>6</sup> As estimated from prospects on Dec. 1.

Table 197.—Citrus fruits: Car-lot shipments, by State of origin, 1921-22 to 1930-31 ORANGES 1

				Crop-	-movem	ent seas	son 2						
State	1921-22	1922-23	1923-24	1 <b>924-2</b> 5	1925-26	1926-27	1927-28	1928-29	1929-30	1930- 313			
California Florida Alabama Mississippi Louisiana Texas Arizona	Cars 28, 376 415, 718 145	Cars 48, 346 23, 006 476 9	Cars 44, 905 33, 418 600 13 3 3 94	Cars 34, 439 25, 091 2 2 3 45	Cars 47, 017 19, 625 338 8 1 6 96		Curs 43, 693 16, 453 812 15 251 26 33		Curs 43, 058 17, 312 485 25 278 156 90	Cars 64, 432 33, 884 2 1 155 119 90			
Total	444, 317	71, 908	79, 036	59, 582	67, 091	76, 313	60, 783	101,742	61, 399	98, 683			
GRAPEFRUIT													
Florida Texas California Arizona Louisiana	12, 943 8 503 62	16, 969 48 507 103	19, 614 99 409 155	20, 087 521 449 159	14, 269 298 546 218	17, 304 747 597 210	14, 166 1, 036 756 211	21, 839 1, 617 822 272	13, 955 3, 493 1, 179 417	26, 072 2, 247 1, 103 436 2			
Total	13, 516	17, 627	20, 337	21, 216	15, 331	18, 858	16, 169	24, 550	19, 045	29, 860			
Total 13, 516   17, 627   20, 337   21, 216   18, 858   16, 169   24, 550   19, 045   29, 860  LEMONS													
California Texas. Arizona Total	9, 907	1	13, 388 1 2 13, 391	11, 680 4 2 1 11, 683	1	13, 496  13, 496	12, 745  12, 745		13, 564 2 13, 566	18, 396 1 18, 397			
	<u> </u>	M	IXED	CITE	US 6	1	1			<u> </u>			
Florida. California Texas Artzona Louisiana		2, 631 1, 033 18 3	3, 608 1, 461 1	4, 226 1, 148 18 10	3, 565 1, 605	5, 313 1, 639 22 10	6, 225 1, 590 92 11 1	9, 109 1, 783 185 24 1	8, 216 1, 343 501 48 10	14, 683 1, 618 288 29 155			
						-1							

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

<sup>1</sup> Include tangerines.
2 Crop-movement season extends as follows: California, from Nov. 1 through October of the following year, except for grapefruit which extends from Sept. 1 through August of the following year; all other States from Sept. 1 through August of the following year, except for lemons, from Nov. 1 through October of the following year.
Preliminary.

<sup>Includes 1 car in August, 1921.
Reported in October, 1924.
No reports available before 1922.</sup> 

Table 198.—Lemons: International trade, average 1925-1929, annual 1927-1930

					Calend	ar year				
Country	A ve: 1925-	rage, -1929	19	27	19	28	19	29	193	0 1
	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports
FRINCIPAL EXPORTING COUNTRIES ItalySpain	1,000 boxes 6,971 474	1,000 boxes 0 0	1,000 boxes 7,345 383	1,000 boxes 0 0	1,000 boxes 6,609 340	1,000 boxes 0 0	1,000 boxes 6,817 618	1,000 boxes 0 0	1,000 boxes 8, 036 690	1,000 boxes 0
Total	7,445	0	7,728	0	6, 949	0	7, 435	0	8, 726	0
PRINCIPAL IMPORTING COUNTRIES										
United Kingdom Germany <sup>3</sup> United States Belgium <sup>3</sup> Czechoslovakia Canada. Poland Rumania	24 257 4 0 0	1,857 1,682 999 456 436 351 297 4 220	0 29 308 4 0 0	1, 827 1, 741 849 95 483 352 308 235	0 28 251 4 0 0	1, 655 1, 665 943 90 382 385 288	23 267 5 0 0	1, 965 1, 859 634 1, 173 459 870 351	28 206 7 0 0	2, 171 2, 158 1, 056 2, 137 480 379 263
Netherlands Hungary Switzerland Yugoslavia	28 0 0	182 172 154 139	29 0 0 0	187 216 153 147	35 0 0 0	170 202 165 144	36 0 0 0	188 196 167 135	34 0 0	238 197 205 173
Total	313	6, 945	370	6, 593	318	6,089	831	7, 497	275	9, 457

Bureau of Agricultural Economics. Official sources.

Table 199.—Lemons, California: Weighted average auction price per box, New York, by months, 1924-25 to 1931-32

Crop year	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Aver- age
1924-23. 1925-26. 1926-27. 1927-28. 1928-20. 1929-30. 1930-31. 1931-32.	Dolls. 4.13 3.82 6.92 4.90 8.70 4.18 3.98	Dolls. 4. 46 4. 03 6. 13 5. 62 8. 63 4. 52 4. 04	Dolls. 4.47 3.91 4.20 6.33 5.26 5.68 4.89	Dolls. 4. 45 4. 16 3. 43 6. 03 3. 95 5. 06 4. 08	Dolls. 4.59 5.40 3.90 5.19 4.07 4.81 4.47	Dolls. 4.75 4.12 3.50 5.54 4.55 5.51 4.06	Dolls, 5.73 4.83 3.89 6.42 3.82 7.24 4.43	Dolls. 6. 84 3. 79 4. 50 6. 04 6. 89 6. 15 5. 05	Dolls. 4.66 4.83 6.44 6.97 5.39 7.28 6.57	4. 67 4. 38 6. 37 6. 11	Dolls. 8. 55 3. 56 8. 82 5. 59 11. 87 5. 36 7. 28	Dolls. 6. 83 4. 50 9. 27 5. 19 11. 22 4. 23 5. 66	Dolls. 4. 35 4. 64 6. 67 5. 82 6. 42 5. 30

Bureau of Agricultural Economics. Compiled from reports of California Fruit Growers Exchange. Prices weighted by number of boxes sold. These prices are a new series and are not comparable with those published in Yearbooks prior to 1930.

Table 200.—Grapefruit, Florida: Weighted average auction price per box, New York, by months, 1924-25 to 1931-32

Crop season	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aver- age
1924-25. 1925-26. 1926-27. 1927-28. 1928-29. 1929-30. 1930-31. 1931-32.	Dolls. 4, 96 5, 35 4, 60 4, 41 4, 51 8, 64 8, 09	3. 97 4. 07 4. 70 4. 25 4. 23 3. 00 2. 60	3. 95 3. 40 4. 71 3. 44 4. 26 2. 82 2. 26	Dolls. 2.83 4.01 3.58 4.82 3.52 4.43 2.56	Dolls. 2.83 4.03 3.75 5.07 3.20 4.09 2.43	Dolls. 2. 71 4. 61 3. 67 5. 52 3. 30 4. 78 2. 50	Dolls. 3. 78 5. 16 3. 59 5. 45 3. 32 5. 09 2. 76	Dolls. 4.38 4.70 3.66 4.92 3.83 4.25 2.57	Dolls. 5. 94 4. 74 3. 80 3. 93 4. 71 3. 24 2. 06	Dolls. (1) 5. 51 2. 44 6. 28 6. 36 8. 10 1. 17	Dolls. 4. 38 3. 66 2 4. 93 8. 70 8 4. 42 4 2. 69

Bureau of Agricultural Economics. Compiled from reports of California Fruit Growers Exchange. Prices weighted by number of boxes sold. These prices are a new series and are not comparable with those published in Yearbooks prior to 1930.

<sup>1</sup> Preliminary.

Fremmany.
 Includes oranges and similar fruits in exports.
 Includes oranges and similar fruits, except for imports for 1927 and 1928.

<sup>4 3-</sup>year average.

Reported for one week only.
 Includes a price in August, 1928, of \$4.51.

Includes a price in September, 1929, of \$5.80.
 Includes a price in September, 1930, of \$4.03.

Table 201.—Oranges: International trade, average 1925-1929, annual 1927-1930

				•	Calenda	r year				
Country	Aver 1925–	age 1929	19:	27	19:	28	19	29	1930	) 1
	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports
PRINCIPAL EXPORTING COUNTRIES Spain Italy United States Palestine Union of South Africa Brazil Japan Cuba	<sup>2</sup> 2, 123 734	1,000 baxes 1 0 14 0 0 0	1,000 boxes 17,538 4,410 3,502 2,645 749 397 479 33	1,000 boxes 0 0 19 0 0 0	1,000 boxes 24, 268 2, 245 2, 678 2, 151 694 605 464 0	1,000 boxes 3 0 24 0 0 0	1,000 boxes 22,407 2,608 5,512 1,813 1,002 1,096 440 0	1,000 boxes 1 0 0 0 0 0	1,000 boxes 30, 654 3, 744 2, 206 2, 998 1, 763 1, 076 378	1,000 boxes 0 0 0 0 0
Total	31, 652	15	29, 813	19	33, 105	27	34, 878	1	42,858	0
PRINCIPAL IMPORTING COUNTRIES  United Kingdom Germany France 3 Canada Netherlands Belgium China Switzerland Czechoslovakia Norway 3 Sweden Egypt Hungary Poland Irish Free State Denmark Yugoslavia	0 81 0 591 292 0 0 0 4 0 0	11, 307 6, 259 3, 793 2, 237 1, 833 462 440 416 391 351 293 255 256 234 161	0 0 57 0 527 313 0 0 0 0 0 0 0 0 0	10, 975 5, 941 3, 668 2, 541 1, 631 461 417 387 360 394 351 215 221 163	3322 0 0 688 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	10, 753 7, 340 4, 008 2, 212 1, 938 947 416 494 426 399 250 300 134 258 244 179	0 0 21 0 743 353 0 0 0 0 0 5 0 0	12, 859 6, 741 3, 700 3, 123 2, 027 549 476 390 434 444 296 123 282 242 180	0 0 26 0 821 323 0 0 0 1 5 0	13, 774 9, 946 5, 851 2, 163 2, 581 315 652 791 549 747 392 414 146 308 253
Total	968	29, 868	900	29, 071	1, 109	30, 742	1, 122	32, 131	1, 182	39, 198

Bureau of Agricultural Economics. Official sources.

Table 202.—Oranges, California, Navel: Weighted average auction price per box, New York, by months, 1924-25 to 1931-32

Crop season	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Мау	June	Aver-
1924-25	B. 00 6. 32 (1) 5. 72 (1) 5. 23 3. 87	Dollars 4.56 5.06 5.55 4.46 5.56 3.58 3.30	Dollars 4. 64 4. 24 4. 69 4. 56 4. 84 4. 98 3. 45	Dollars 4.47 4.55 4.71 5.18 3.89 4.99 3.27	Dollars 5, 35 4, 70 4, 54 5, 52 3, 52 5, 67 3, 42	Dollars 5. 48 5. 50 4. 89 5. 98 4. 06 0. 03 3. 32	Dollars 6, 51 4, 73 4, 43 7, 39 3, 56 6, 64 3, 93	Dollars 6. 21 5. 56 5. 60 3. 56	Dollars 4 80 4 74 4 10

Bureau of Agricultural Economics. Compiled from reports of California Fruit Growers Exchange. Prices weighted by number of boxes sold. These prices are a new series and are not comparable with those published in Yearbooks prior to 1930.

Preliminary.

<sup>4-</sup>year average.

<sup>3</sup> Includes some lemons.

<sup>4 3-</sup>year average.

<sup>1</sup> Reported for 1 week only.

Table 203 .- Oranges, California Valencia: Weighted average auction price per box. New York, by months, 1925-1931

Crop season	Apr.	Мау	June	July	Aug.	Sept.	Oct.	Nov.	Aver-
1925	Dollars 4. 80 4. 92 4. 66 5. 94 (2) 6. 59	Dollars 6. 28 4. 58 4. 43 7. 38 4. 40 7. 97 3. 42	Dollars 7. 43 4. 46 4. 08 7. 22 4. 58 7. 19 3. 62	Dollars 6. 40 5. 21 5. 90 7. 58 4. 13 7. 36 4. 31	Dollars 6. 47 4. 89 6. 15 7. 45 4. 85 7. 33 3. 81	Dollars 7. 58 5. 39 6. 73 7. 77 4. 73 7. 29 3. 86	Dollars 8, 23 6, 44 7, 02 7, 53 4, 85 8, 69 4, 50	Dollars 9. 90 6. 79 6. 71 6. 79 4. 77 7. 78 3. 79	Dollars 7. 15 5. 28 6. 00 7. 45 4. 63 7. 59

Bureau of Agricultural Economics. Compiled from reports of California Fruit Growers Exchange. Prices weighted by number of boxes sold. These prices are a new series and are not comparable with those published in Yearbooks prior to 1930.

Table 204.—Oranges, Florida: Weighted average auction price per box, New York, by months, 1924-25 to 1931-32

Crop season	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Мау	June	Aver- age 1
1924-25. 1925-21. 1926-27. 1927-23. 1928-23. 1920-30. 1930-31. 1931-33.	7.45 3.70 3.67 5.08 3.42 4.76 2.64	7. 19 4. 79 6. 31 3. 71 4. 04 3. 45 3. 20	Dollars 4.00 3.53 5.59 8.55 4.21 3.01 3.11	Dollars 3, 68 4, 25 3, 76 5, 23 3, 45 4, 49 2, 91	Dollars 4, 26 4, 44 3, 91 5, 97 3, 30 4, 44 3, 19	Dollars 5, 69 5, 02 4, 10 6, 29 3, 30 4, 98 3, 79	Dollars 0. 43 5. 80 4. 80 6. 84 3. 55 7. 13 3. 80	Dollars 7. 82 5. 87 4. 75 8. 58 3. 33 7. 42 3. 85	Dollars 8. 26 6. 72 4. 54 9. 11 2. 99 6. 60 4. 02	5. 10 4. 11 6. 24 3. 40 4. 94 3. 54

Bureau of Agricultural Economics. Compiled from reports of California Fruit Growers Exchange. Prices weighted by number of boxes sold. These prices are a new series and are not comparable with those published in Yearbooks prior to 1930.

Table 205.—Corn, sweet, commercial crop for manufacture: Acreage, production, and price per ton, by States, 1928-1931

		Acro	age			Produ	iction		Sea	sonal f		rice
State	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
Maine New Hampshire Vermont New York Pennsylvanis Ohio Indiana Illinois Michigan Wisconsin Minnesota Iowa Nebraska Delaware Maryland Tannessee Other States 1	Acres 10, 770 1, 110 27, 000 4, 140 27, 390 8, 930 14, 780 33, 000 8, 470 4, 470 8, 470 4, 470 8, 500 8, 500 8, 500 8, 700	1, 320 2, 370 6, 000 31, 000 38, 500 64, 000 11, 600 45, 800 5, 740 3, 900 44, 000 3, 400 8, 830	2, 100 23, 000 6, 300 32, 500 43, 500 72, 000 7, 300 54, 000 5, 000 3, 400 3, 830	900 1,280 17,300 8,500 30,300 38,000 68,600 12,500 48,700 53,800 3,100 38,800 3,680	2, 600 4, 700 32, 400 39, 100 38, 300 128, 300 29, 600 9, 600 9, 800 7, 300 53, 200 6, 500	3, 300 6, 200 36, 900 6, 006 62, 000 50, 000 134, 400 24, 400 109, 900 12, 000 5, 800 61, 600 8, 800	3, 200 4, 800 29, 900 5, 000 35, 800 56, 600 144, 000 31, 200 110, 800 6, 500 23, 800 6, 800 8, 500	2,600 3,200 43,200 9,400 72,700 83,600 164,600 28,800 88,100 122,700 10,900 9,400	23. 70 18. 30 16. 50 13. 80 13. 00 12. 70 12. 40 11. 50 9. 40 12. 00 14. 00 14. 00 13. 85	23. 80 18. 20 17. 00 15. 00 11. 20 13. 00 12. 80 11. 80 11. 80 11. 00 13. 00 14. 60 13. 95	23. 10 17. 70 16. 00 13. 20 13. 00 13. 00 11. 10 10. 40 10. 50 14. 50 14. 50	18. 40 12. 40 17. 00 18. 50 9. 90 11. 00 10. 10 10. 10 9. 50 8. 70 10. 50 11. 70 11. 90
U. S. total	305, 960	357, 310	375, 560	350, 560	592, 900	704, 400	659, 700	771, 800	12.68	13. 14	13. 24	11. 32

Bureau of Agricultural Economics. Estimates based upon returns from canning establishments.

<sup>&</sup>lt;sup>1</sup> Includes prices in December as follows: 1925, \$2.14; 1926, \$6.69; 1927, \$5.75; 1929, \$4.85. 
<sup>2</sup> Reported for 1 week only.

<sup>&</sup>lt;sup>1</sup> Includes prices in other months as follows: 1926-27, \$3.12 in July; 1928-29, \$2.92 in July, and \$2.29 in August; 1930-31, \$2.61 in Sept., 1930, and \$4.62 in July, 1931.

Tonnage in husk.
 Other States include Colorado, Idaho, Kentucky, Missouri, Montana, Oregon, South Dakota, Utah, Washington, and Wyoming.

Table 206.—Corn, canned: Pack 1 in the United States, 1919-1931

						1	Season						
State	1919	1920	1921	1922	1923	1924	1295	1926	1927	1928	1929	1930	1931
Maine	1,000 cases 1,652 1,014 1,360 586 2,225 456 2,496 2,081 1,045	1, 544 861 2, 271 590 643 3, 246 2, 217 1, 251	564 850 709 1, 711 576 573 1, 190 1, 130 629	616 1,073 665 1,939 625 598 1,959 1,944 934	434 1, 390 1, 208 2, 833 648 898 2, 382 2, 256 1, 134	787 846 2,310 388 1,199 1,764 1,707 1,087	1, 311 2, 375 2, 223 4, 030 1, 148 1, 541 4, 105 3, 678 2, 216	1, 038 1, 735 2, 044 3, 053 843 1, 762 3, 361 2, 133	676 846 703 1,961 310 1,088 1,377 1,493 1,087	1, 648 2, 541 1, 648 1, 164	782 1,551 1,250 8,153 547 2,604 2,909 1,865 1,306	647 750 1, 272 3, 261 686 2, 912 2, 552 622 1, 060	1, 080 1, 871 2, 362 3, 788 712 1, 835 3, 227 1, 956 1, 339

Bureau of Agricultural Economics. Compiled from National Canners' Association data, 1919–1926; Bureau of Census, 1927–1929; beginning 1930, Foodstuffs Division, Bureau of Foreign and Domestic Commerce.

Table 207.—Cranberries: Production and December 1 price, by States, 1926-1931

State			Produ	ection			F	rice pe	r barr prod		ved by	7
Dunc	1926	1927	1928	1929	1930	1931 1	1926	1927	1928	1929	1930	1931
Massachusetts New Jersey Wisconsin Washington Oregon	Bbls. 430, 000 210, 000 80, 000 16, 600 7, 000	75,000 24,000 21,000		90,000 42,000 11,000	144, 000 40, 000 8, 480	142, 000 45, 000 9, 000	7.75 7.00 8.00 7.80	11. 00 13. 50 12. 00	15.00 13.00 16.00 13.50	13. 25 12. 00 13. 50 14. 25	10.00 9.75 12.50 12.75	6.00 5.50 7.00 7.50
United States	743, 600	496, 000	551, 000	548, 800	560, 480	651, 000	7.56	12. 28	14. 51	13. 10	10. 15	5. 99

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board. Prices are based upon returns from crop reporters.

Table 208.—Cucumbers, commercial crop: Acreage, production and price per bushel 1928-1931

Utilization		Acre	age			Prod	uction		Seaso	nal far bus	m pric	e per
Companion	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
For market For pickles Total	Acres 41, 830 76, 790		117, 690	85, 220	4, 456 4, 902	4, 598	1,000 bush.1 16, 186 7, 656	5, 976	1. 28 . 84	1, 73 . 82	.79	

Bureau of Agricultural Economics. Estimates based upon return from crop reporters and pickle manu-

<sup>1</sup> Stated in cases of 24 No. 2 cans.

<sup>&</sup>lt;sup>1</sup> Preliminary.

Bushels containing approximately 48 pounds.
 Includes some quantities not harvested on account of market conditions. Price refers to harvested portion of crop.

Table 209.—Figs: Production and value, California, 1922-1931

		Figs, dried	l	Figs, m	arketed fi canned	esh and
Year	Produc- tion	Seasonal farm price	Farm value	Produc- tion	Seasonal farm price	Farm value
1922 1923 1924 1925 1926 1927 1927 1928 1929 1930	Short tons 11, 000 9, 500 8, 500 11, 350 12, 000 11, 500 17, 000 21, 000	Dollars 120, 00 90, 00 100, 00 110, 00 95, 00 45, 00 45, 00 90, 00 48, 00 2 37, 00	1,000 dolls. 1,320 855 850 1,056 1,078 540 518 1,580 1,008 629	2, 135 3, 075 5, 100 5, 400 6, 130 7, 300 7, 700 6, 300	Dollars  104. 00 100. 00 112. 00 100. 00 87. 00 100. 00 90. 00 2 74. 00	1,000 dolls. 

Bureau of Agricultural Economics.

Table 210.—Grapes: Production, farm price, imports and exports, United States, 1922-1931

		Production				Foreign	trade, ye	ar beginni	ng July 2
Year	Total.			United States seasonal	United States value,basis		TT-14-2	United net ex	States ports 3
	United States	California.	Other States	farm price per ton <sup>1</sup>	seasonal farm price 1	States domestic exports	United States imports	Total	Percent- age of produc- tion
1922	6 2, 605, 238 6 2, 671, 076 2, 080, 045	2, 030, 000 1, 535, 000 6 2, 050, 000 6 2, 129, 000 6 2, 406, 000 1, 827, 000 6 2, 181, 000	275, 171 197, 395 242, 722 152, 085 309, 413 199, 238 305, 076 253, 045	48.09 31,88 41.79 32.03 26.66 26.52 19.75	95, 271, 520 71, 009, 078 74, 297, 480 66, 115, 000 64, 604, 000 65, 332, 000 49, 740, 000 55, 915, 000 44, 040, 000	7,011 10,128 10,151 12,134 15,396 19,410 27,819 23,079 24,900	10, 015 1, 608 1, 415 1, 011 1, 735 1, 703	4 9, 315 198 8, 566 10, 735 14, 414 17, 747 26, 155 20, 448	(b) 0. 5 . 5 . 6 . 7 1. 0 1. 0

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board. Prices are based upon returns from crop reporters. Estimates of production for 1929 and 1930 revised on basis of 1930 census. Earlier years not so revised.

<sup>1</sup> Preliminary.

<sup>&</sup>lt;sup>2</sup> Seasonal average price to Dec. 1.

<sup>1</sup> For years 1925–1931, the average price for the States reporting price, except California, is used for computing the value of the grape crop in the less important States for which no price is determined. Price and value are based on quantities actually harvested plus a quantity of fruit that was sold but left on the vines in 1930 and 1931.

2 Compiled from Monthly Summary of Foreign Commerce of the United States, June Issues, 1923–1928; January and June issues, 1927–1931.

3 Total exports (domestic plus foreign) minus total imports.

4 Net import equals total imports minus total exports (domestic plus foreign).

5 Less than 0.05 per cent.

5 Includes fruit in California not harvested as follows: 188,000 tons in 1925, 15,000 in 1926, 142,000 in 1927, 183,000 in 1928, 433,000 in 1930, and 10,000 in 1931. (See also last sentence of Note 1.)

Table 211.—Grapes: Car-lot shipments, by State of origin, 1920-1931

State					Crop	- mover	nent se	son 1				
5440	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931 2
New York	152	Cars 2,535 390 1,292 77 4 3 64 33,344 108	219	Cars 4, 312 847 4, 202 217 58 83 62 55, 348 257 65, 336	Cars 5, 641 1, 166 4, 680 79 101 243 83 57, 695 245	Cars 3, 763 589 398 50 186 394 191 78, 066 261 81, 878	Cars 7, 242 1, 350 3, 081 176 686 1, 170 125 64, 327 433 78, 590	Cars 3, 050 689 2, 023 196 108 108 167 75, 925 411	332	Cars 2, 541 579 1, 746 369 225 510 232 59, 205 395 66, 102	Cars 2, 649 869 1, 620 226 316 322 117 65, 185 271	Cars 4, 215 1, 282 525 184 337 313 94 39, 270 186

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in carlots include those by boat reduced to car-lot basis.

Table 212.—Grapes: Number of packages of California varieties sold, and weighted seasonal average price, auction sales in 11 markets, 1926-1931

	Nu	mber of	packag	es (crat	es and l	ugs)		Ave	rage pr	ice per	packa	ge
	1926 2	1927 8	1928 4	1929 8	1930 6	1931 7	1926	1927	1928	1929	1930	1931
Tokay	Thou- sands 2, 495 333 (*) 1, 752 3, 737 2, 429 3, 167 774 625 193 499 244 1, 017	Thou-sands 2, 785 236 (8) (2, 531 3, 719 4, 660 4, 475 1, 313 575 299 530 316 1, 592	Thou-sands 2, 762 103 (8) (8) (2, 484 3, 129 4, 888 4, 966 1, 711 558 320 585 365 1, 680	Thou-sands 1, 855 56 113 89 2, 713 2, 027 4, 759 541 193 270 257 1, 402	Thou- sands 2, 489 41 119 152 2, 377 2, 095 5, 123 1, 973 267 170 283 235 1, 112	Thou-sands 1, 591 991 157 184 1, 555 2, 976 931 3, 450 1, 654 172 303 113 624	Dol- lars 1. 43 1. 38 (8) 1. 16 1. 21 1. 02 1. 65 1. 47 1. 22 1. 37 1. 31 1. 27	Dol- lars 1. 40 1. 15 (9) 1. 36 1. 22 1. 02 1. 59 1. 32 1. 17 1. 30 1. 06 1 35 1. 30	Dol- lars 1. 34 1. 15 (8) 1. 05 1. 17 .81 1. 22 1. 06 .96 .96 1. 00	Dol- lars 1. 42 1. 62 2. 20 1. 86 1. 43 1. 37 1. 06 1. 20 1. 14 1. 23 1. 14 1. 14	Dol- lars 1. 15 1. 06 1. 79 1. 67 1. 28 1. 08 1. 11 . 97 . 98 1. 13 . 91 1. 11 1. 06	Dol- lars 1. 59 1. 61 1. 93 1. 71 1. 13 1. 16 1. 11 1. 16 1. 11 1. 19 1. 15 92 1. 05
Total or average	17, 265	23, 031	23, 551	17, 141	18, 628	15, 000	1. 31	1.30	1.08	1. 29	1. 11	1, 29

Bureau of Agricultural Economics. Compiled from daily reports of the fruit and vegetable market news service. Principal varieties only shown.

<sup>&</sup>lt;sup>1</sup> Crop movement season extends from June 1 through December of a given year.

<sup>2</sup> Preliminary.
3 Frigures include shipments in succeeding crop year as follows: 1920, January, 1 car; 1921, January, 2 cars; 1922, January 7 cars; 1923, January, 13 cars; 1924, January, 6; cars February, 2 cars; 1925, January, 21 cars; 1926, January, 2 cars; February, 2 cars; 1926, January, 31 cars; February, 2 cars; 1926, January, 32 cars; February, 32 cars; February, 32 cars; February, 33 cars; February, 34 cars; February, 4 cars; February, 54 cars; February, 55 cars; February, 55 cars; February, 56 cars; February, 57 cars; February, 58 
Baltimore, Boston, Chicago, Cincinnati, Cleveland, Detroit, Minneapolis, New York, Philadelphia, Pittsburgh, and St. Louis.
 Aug. 5 to Nov. 6.
 Aug. 2 to Nov. 12.
 July 19 to Nov. 30.
 Aug. 5 to Nov. 9.
 Aug. 5 to Nov. 9.
 Aug. 4 to Nov. 8.
 July 22 to Dec. 18.
 1928. 1927. and 1928 not available.

<sup>8 1926, 1927,</sup> and 1928 not available.

TABLE 213.—Grapes: Estimated production and seasonal farm price by States, 1926-1931

			Production	cction				Se	asonal farm	Seasonal farm price per ton		
State and division	1926	1927	1928	1929	1930	1931 \$	1926	1927	1928	1929	1930	1931
	Short tons	Short tens	Short tons	Short tons	Short tons	Short	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
Maine New Hampshire	488	86:	91	288	225	823						
Vermont	929	4 15	22	<b>3</b>	42							
Rhode IslandConnection		152	1314	1.27	1.56		55,00					
New York	106,700	51,520	85,470	79, 500	3,017	8	35.50 50.00	62.00	46.00	86.00 50.00	86.9 8.90	22 00
Pennsylvania		14,550	22, 680	21, 962	25, 180	83	34.00					22.00
North Atlantic	130, 914	70, 893	118, 165	106, 142	107, 078	187, 789						
Ohio					20,300							88.8
Indiana					2,70	604 004 008	2.5 8.8	88	88	8 S	<del>3</del> .4	8.4 8.8
Michigan	90,00	51,700	2,800	,88, 118,	, & 6	, 55 100 100 100 100 100 100 100 100 100 1						88.00
Wisconsin	65.8	7290	285	2000	250	28						
IOWB.		70's					50.00				3.8 8.8	88 88
Nebraska	1,584	386,	1,1,000	2,917	2,632	188	20.00	32,3	18: 18:	388	15. 18. 18.	
Kansas		8, 735					ca 00					
North Central	125,848	96, 141	139, 583	106, 160	113, 354	114, 450						
Delaware			1, 600		2,268	2,104						
Maryland			2,200	988					50.00	65.00	80.00	80.00
West Virginia			23.5			1,304	90 93	9	20	90 40	00	90
South Carolina	o-1°	1, 540	1,726	6 118 118	984		96.00	3 30	#0.0#	00.00	90.00	8 100
Georgia.		1, 472	1, 672	1218	88	1,020						
South Aflentia	18 580	13 957	17, 079	11.804	11.917							
Kentucky	1.274	632	1,200	823	555	1,080						
Alabama		120		8	983							
Arkansas	13,900	8.00,	17,000	7, 818	, 20±		38.00	65.00	500	60.00	30.00	40.00

58.00		244124242 24412424242 268888 2688888	26. W
60.00		88	10, 01
66.00		8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	76, 00
66.00		\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	18. 10
		25.50 25.50 24.50 24.50 24.50 25.50	20.02
		25.55 25.53	24.00
2, 550 1, 540	17, 753	580 1,000 1,900 1,900 1,900 1,900 1,900 1,900 1,900 1,290 1,200 1,	1, 002, 004
2, 275 1, 650	13, 680	866 280 700 700 1,200 4,000 4,800 4,800 1,300 1,	* 2, 405, 014
2,745 1,954	15, 056	628 1, 688 1, 1083 1, 1040 8, 605 1, 1040 1, 1082 1, 1040 1, 1, 1040 1, 1040 1	2, USU, USD
2, 100 1, 440	24, 164	288 287 600 1,785 1,785 2,000 4,300 2,400 4,300 2,400 4,300 2,400 2,400 2,400 2,400 2,400 2,400 2,400 3,400 4,400 3,400 4,400 3,400 4,400	* 4, 011, 010
1, 732 1, 260	8, 456	804 488 11, 900 1, 900 1, 920 2, 020 2, 020 443, 000 1, 443, 000 1, 443, 000 2, 416, 701 2, 000 2, 416, 701	, z, ouo, zoo
1, 800	20, 201		. 2, 450, 110
Louisiana Oklahoma Texas	South Central	Idabo Calorado New Mexico Artona Artona Utah Nevada Washington Conegon Wilno varieties Raisin varieties Driod Table varieties Not dried Table varieties	United States

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Estimates of production for 1929 and 1930 revised on basis of 1930 Census. Earlier years not so revised.

1 The sverage price for the States reporting price, except California, is used for computing the value of the grape crop in the less important States for which no price is determined.

Prices and value are computed on the harvested crop plus a quantity of fruit that was sold but left on the vines in 1930 and 1931.

1 Prices and value are computed on the harvested crop plus a quantity of fruit that was sold but left on the vines in 1930 and 1931, 19,000 tons, 1930, 40,000 tons, 1930, 40,000 tons, 1931, 10,000 tons, 1931, 10,000 tons, 1932, 1930, 1932, 1933, 1

Table 214.—Grapes, Concord: Average l. c. l. price to jobbers in 12-quart baskets, specified markets, by State of origin, October, 1924-1931

		New Yorl	c Concord		Mic	higan Con	cord
Year	Boston	New York	Philadel- phia	Pitts- burgh	Chicago	Minne- apolis	St. Louis
1924 1925 1926 1927 1928 1928 1928 1930	Cents 91 102 61 56 60 57	Cents 84 114 62 61 54 54 51	Cents 90 104 58 64 49 51 54 34	Cents 85 109 60 64 51 48 48	Cents 68 109 43 55 44 41 41 32	Cents  118 67 76 59 56 53 44	Cents 72 56 65 53 49 56 42

Bureau of Agricultural Economics. Compiled from daily market reports from bureau representatives in the various markets.

Table 215.—Lettuce: Car-lot shipments, by State of origin, 1920-1931

C4.4.					Crop-1	novem	ent s	eason 1				
State	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931 2
New York New Jersey North Carolina South Carolina Florida Idaho Colorado Arizona Washington California Other states	Care 1, 775 208 207 121 2, 666 25 129 248 854 5, 997 412	469 445 716 2, 910 180 234 114 635 9, 223 531	572 622 987 2, 899 812 577 812 10, 321 654	456 718 576 2, 926 1, 241 1, 436 834 1, 082 13, 916 791	416 714 424 2, 490 533 1, 036 1, 776 673 17, 040 661	463 537 736 2, 190 500 3, 096 2, 689 820 20, 999 658	540 372 707 398 2, 795 4, 572 904 25, 126 541	308 447 369 950 196 2, 848 7, 679 1, 151 28, 502 400	144 477 241 880 72 2, 368 9, 325 1, 240 32, 122 319	169 363 310 1, 117 76 2, 109 9, 285 1, 747 33, 854	27 364 169 560 154 1, 610 8, 431 2, 230 38, 736	18 498 278 940 177 7,850 1,770 35,211 152

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

<sup>&</sup>lt;sup>1</sup> Crop movement season begins in October of the previous year and extends through December of the given year, i. e., 1920 season begins in October, 1919, and extends through December, 1920.

<sup>3</sup> Preliminary.

Table 216.—Lettuce, commercial crop: Acreage, production, and price per crate, by States, 1928-1931

Group and State		Acre	age			Produ	ction		Season	nal farı cra		e per
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
Early: <sup>2</sup> Arizona California (Imperial) Florida	Acres 12, 700 22, 000 1, 840	Acres 16, 500 27, 250 2, 000	Acres 14, 000 38, 100 1, 560	Acres 18, 100 41, 000 2, 450	1,664	1,766	1, 260	1,000 crates <sup>1</sup> 1, 267 3, 649 646	Dolls. 0.98 1.62 1.61	Dolls. 1. 60 2. 09 1. 18	Dolls 2, 30 1, 74 1, 92	Doll*. 1. 20 1. 56 . 78
Lettuce Escarole	1, 500 340	1, 500 500	1, 100 460	1, 600 850	345 153	405 230	248 259	371 275	1. 70 1. 40	1. 29 1. 00	2. 20 1. 65	. 80 . 76
Texas	1,000	800	740	300	100	160	24	22	1.02	1.00	1.00	1.00
Group total	37, 540	46, 550	54, 400	61, 850	6,002	6, 567	6,058	5, 584	1, 43	1.84	1.87	1.39
Second early: Arizona California (other) North Carolina South Carolina	13, 500 24, 500 1, 490 750	26, 150	23, 000 31, 570 1, 400 450	16, 000 81, 600 1, 500 600	3, 479 171	2,693 136	1, 725 3, 062 130 59	3,729 201	1,60	1.86 1.65	1. 45 2. 02 . 98 2. 16	1. 06 1. 42 . 60 1. 24
Group total	40, 210	38, 910	58, 420	49, 700	5, 180	4,660	4, 976	5, 303	1, 55	2, 22	1, 80	1.30
Intermediate: Idaho New Jersey Oregon Virginia Washington	50	60 1, 000 70 280 2, 500	70 950 80 200 3, 350	70 1,000 80 200 3,000	270 7 60	6 57	142 8 28	250 6 36	1.70 1.25 1.45	1.90 1.30 1.00	1.86 1.05 2.00	1,20 .80 1,75
Group total	8, 450	3, 910	4, 650	4, 350	712	797	862	901	1, 31	1.42	. 99	. 93
Late (Sec. 1): California Colorado New Mexico New York Pennsylvania	7, 800 8, 800 430 4, 460 80	9, 630 8, 100 250 5, 800	7, 440 200 5, 450	6, 650 200	1,012 30 1,004	891	670	598 22 1, 010	1.07 1.35 2.08	1.25 1.20 3 1.13	.85 1.05 1.05	1,30 .90 1,45
Group total	21, 570	23, 860	25, 870	24,780	3,030	3, 857	3, 84	3, 179	1.96	1.46	1. 39	1.86
Late (Sec. 2): California Idaho New Jersey Oregon Washington Wyoming	280	290 700 50	840 650 50	34, 200 380 1, 000 250 450	160	150 5	150	57 100 38	1.67 2.26 1.2	7 .78 3 2.20 5 1.30 5 1.50	1.00 1.76 .80	1.10 1.20 1.95 1.05
Group total		25, 930			<u> </u>	4, 339	'			1 1.74	1.8	1.47
Total all States_	123, 740	139, 160	172, 620	176, 960	18, 38	20, 220	19, 59	18, 569	1.69	1.82	1.7	1.44

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters.

Table 217 .- Olives: Production and value, California, 1922-1931

Year	Produc- tion	Seasonal farm price	Farm value	Year	Produc- tion	Seasonal farm price	Farm value
1922	Short tons 10, 000 17, 000 6, 500 14, 000 12, 000	Dollars 125.00 65.00 92.00 60.00 80.00	1,000 dollars 1,250 1,105 598 840 960	1927 1928 1929 1930 1931	Short tons 21, 500 23, 900 21, 000 20, 000 16, 000	Dollars 80.00 80.00 75.00 70.00 2 54.00	1, 000 dollars 1, 720 1, 912 1, 575 1, 400 864

Bureau of Agricultural Economics.

<sup>1</sup> Western crates containing 4 dozen heads. 2 Season begins in fall of the previous year.

<sup>&</sup>lt;sup>1</sup> Preliminary.

<sup>&</sup>lt;sup>2</sup> Seasonal average price to Dec. 1.

Table 218.—Olive oil (including inedible): International trade, average 1925-1929, annual 1927-1930

					Calend	ar year				
Country		re 1925– 29	19	27	19	28	19	29	193	0 1
	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports
PRINCIPAL EXPOSTING COUNTRIES Spain			pounds 122, 252 76, 527	pounds 0 1, 221	263, 197 29, 697	0	1,000 pounds 113,251 79,298 95,803	0 313	1, 000 pounds 235, 678 159, 208 109, 301	· (
Spain Italy	28, 599 28, 466 18, 185 4, 283 4, 206 1, 077	123 115 198 339 282 861	20, 389 13, 190 23, 845	85 193 312 306	20, 215 48, 096 5, 034 904	82 38 42 295 186	31, 709 28, 505 33, 928 5, 618 6, 802	162	18, 514 54, 152 10, 452 6, 397	6 41 1, 36 54
Total	370, 232	5, 147	323, 026	8, 162	409, 518	7, 956	397, 153	2, 003	594, 027	131, 20
PRINCIPAL IMPORTING COUNTRIES										
United States Argentina 3 Argentina 3 France United Kingdom Cuba Chile Uruguay Brazil Norway Macao (Portuguese China) 3 Portugal Palestune Canada Switzerland Egypt Germany Mevico Rumania Australia 3 Belgium Peru Bulgaria Czechoslovakia Sweden Japan Japan Philippine Islands New Zealand	0 13, 958 324 0 0 0 0 4 2, 331 5, 722 710 0 2 2 32 53 0 0 0 1 1 1 833 0 0 0 2 2 4 2, 324 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	16, 654 14, 103 12, 808 7, 098 6, 619 6, 659 6, 659 6, 726 4, 044 3, 443 3, 443 3, 443 1, 545 1, 319 1, 272 1, 272 1, 295 454 3312	0 17, 151 392 0 0 0 1, 859 2, 140 0 7 30 50 4 11 17 17 17 17 17 0 0	27, 467 18, 980 12, 919 10, 326 9, 60 5, 202 23, 720 24, 421 4, 448 2, 438 1, 351 1, 031 1, 031 312 309	0 17, 508 273 0 0 0 0 0 0 337 13, 541 479 0 0 46 0 0 0 46 0 0	18, 927 28, 679 16, 577 20, 005 7, 163 6, 395 3, 734 2, 919 2, 508 1, 841 1, 313 1, 667 1, 119 452 2, 271	14, 347 338 0 0 0 0 0 0 3, 331 361 0 0 26 87 0 0 0 111 10 0 0 0	7, 796 13, 790 9, 31, 790 9, 31, 790 10, 453 	27, 659 269 0 0 0 0 1, 147 1, 147 50 0 24 50 0 23 23 23 3	21, 176 21, 644 6, 733 18, 753 18, 390 5, 883 22, 144 6, 487 4, 847 4, 847 1, 530 1, 656 1, 207 8, 100 1, 207 1, 207
Denmark	- 6	181 173 154	17 0 4	150 141 209	4 0 7	209 273 116	0	185 166 194		28 31 334
Total	23, 208	398, 508	25, 148	354, 967	32, 794	437, 256	18, 515	429, 446	37, 220	525, 25

Bureau of Agricultural Economics. Official sources except where otherwise noted. Conversions made on the basis of 7.5 pounds to the gallon.

4 4-year average.

Preliminary.
 2-year average.
 International Yearbook of Agricultural Statistics.

Table 219.—Onions, commercial crop: Acreage, production, and price per bushel, by States, 1928-1931

Group and State		Acn	eage			Produ	ıction		Sease	onal fa	rm pric er busk	e to
	1928	1929	1030	1931	1928	1929	1930	1931	1928	1929	1930	1931
Early (Bermuda and Oreole): California Louisiana Texas	8, 950 2, 310	Acres 3,450 2,180 19,700	2, 050 1, 260	1, 250 1, 100	1,000 bush.1 2980 293 3,546	1,000 bush.1 869 277 3,763	1,000 bush.1 570 77 3,360	1,000 bush.1 339 94 23,492	Dolls. 0. 77 . 89 1. 10	1. 25 1. 09		
Group total	24, 540	25, 330	19, 620	19, 550	2 4, 819	4, 909	4,007	3 3, 925	1.03	1.06	. 75	.77
Intermediate (domestic): California	780 1,000 800	1,000	1,050 510	1,050 400	288 320	260 48	336 18	194 150	.88	.86	.91 .75	.85 .70
District Virginia, E. Shore Washington. Walla	2,000 500	700	560	560	92	119	56		. 51	1. 15	1.00	.70
Walla Co	700											
Group total	8, 480	7, 120	7, 460	8, 120	2,751	1,997	1,963	2, 327	. 70	- 89	. 76	.72
Late (domestic): California. Colorado. Idabo. Illinois. Indiana. Iowa, other. Massachusetts. Michigan Minnesota. Nevada. Nevada. New York. Ohio. Oregon. Pennsylvania. Utah. Washington, other.	3, 760 1, 000 740 8, 510 1, 760 5, 000 1, 740 	7,000 1,000 8,400 1,950 5,700 2,160 7,910 6,600 1,040 1,100 850	5, 600 1, 700 9, 120 2, 0730 6, 700 2, 650 8, 400 1, 080 1, 080 1, 200 950	4,050 1,500 7,750 1,500 2,520 6,260 1,900 8,200 5,300 1,100 900	700 169 2,042 579 840 1,350 632 1,283 891 361 86 520	2,583 475 212 2,436 2,029 756 32 3,243 1,650 406 475 408	1, 725 629 188 3, 493 1, 147 2, 767 702 43 3, 576 1, 404 486 868 898 428	923 825 110 1, 318 970 1, 171 380 25 2, 780 874 468 91 305 405	1. 42 1. 14 1. 22 1. 60 1. 15 1. 01 1. 28 1. 35 1. 60 1. 43 1. 12	. 45 . 50 . 76 . 56 . 60 . 62 . 62 . 63 . 64 . 75 . 65 . 60 . 64 . 75 . 60 . 60 . 60 . 60 . 60 . 60 . 60 . 60	. 32 . 30 . 72 . 37 . 48 . 63 . 43 . 42 . 45 . 42 . 32 . 30 . 30 . 30 . 30 . 30 . 30 . 30 . 30	74 90 90 70 90 90 90 90 90 90 90 90 90 90 90 90 90
Group total	47, 800	54, 890	55, 980	49, 010	13, 021	<sup>2</sup> 18,583	20,032	12, 605	1. 35	. 63	. 48	. 80
Total domestic	56, 280	62, 010	63, 440	57, 130	15, 772	20,580	21,995	14, 932	1. 23	. 66	. 46	. 79
Total all States	80, 820	87, 340	83, 060	76, 680	20,591	2 25,489	26,002	18,857	1. 19	. 74	. 51	. 79

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters.

Table 220 .- Onions: United States imports, by countries, annual, 1920-21 to 1930-31

Year beginning July—	Neth- er- lands	Spain	Italy	United King- dom	Can- ada	Ca- nary Is- lands	Ber- mu- da	Mex- ico	Chile	Aus- tra- lıa	Egypt	Other coun- tries	
1921-22 1922-23 1923-24 1923-25 1925-26 1925-26 1926-27 1928-29 1928-29 1928-30 1930-31	60	1,000 bush. 1,522 990 1,098 1,090 1,342 1,084 701 1,007 768 177	19	1,000 bush. 247 157 52 71 36 59 12 26 11	1,000 bush. 66 42 1 29 11 9 2 4 (1)	1,000 bush. 18 13 8 7 4 2 1 2	1,000 bush. 34 18 9 9 9 9 9 (1)	1,000 bush. 26 20 29 18 20 1 (¹) 11 (¹)	1,000 bush. 43 1 30 79 26 76 213 134 49 10	1,000 bush. 119 3 4 8 3 8 3 4 2 0	1,000 bush. 243 447 148 618 599 912 892 105 38	1,000 bush. 56 48 10 67 83 25 26 32 2	1,000 brush. 2,488 1,783 1,406 2,075 2,194 2,298 1,399 2,050 918 214

Bureau of Agricultural Economics. Compiled from official records of the Bureau of Foreign and Donestic Commerce.

<sup>&</sup>lt;sup>1</sup> Bushels containing approximately 57 pounds.

<sup>2</sup> Includes some quantities not harvested on account of market conditions. Price refers to harvested portion of crop.

<sup>1</sup> Less than 500 bushels.

Table 221.—Onions: Car-lot shipments, by State of origin, 1920-21 to 1930-31

				(	Orop-m	ovemen	t seasor	1			
State	192021	1921-22	1922-23	1923-24	1924-25	1925-26	1926–27	1927-28	1928-29	1929-30	1930-31
Massachusetts New York New Jersey Ohio Indiana Illinois Michigan Wisconsin Minnesota Iowa Virginia Kentucky Texas Idaho Colorado Utah Washington Oregon California Other States	371 3, 239 4, 124 409 939 409 287 830 139 304 4, 957 28 150 9 810 27	Cars 2, 244 2, 890 429 1, 749 1, 972 251 417 90 169 416 280 382 4. 209 50 447 702 3, 343 3, 543 2554	Cars 1, 912 2, 812 479 4, 493 4, 684 4, 837 1, 867 330 500 927 371 258 4, 636 161 651 170 765 263 3, 631	Cars 2, 454 5, 505 335 2, 714 4, 610 378 1, 222 273 189 882 274 256 928 177 1, 128 3, 027 4, 145 830	Cars 2, 481 5, 385 403 4, 492 3, 735 241 1, 623 2427 1, 176 345 245 3, 918 322 1, 006 5, 571 2, 671 235	Cars 2, 856 5, 109 225 1, 856 4, 188 2201 1, 402 367 1, 365 138 3, 941 876 1, 809 1, 000 681 3, 603 540	Cars 3, 586 3, 720 253 2, 257 4, 493 158 2, 171 270 684 1, 434 178 134 5, 316 531 1, 758 602 1, 200 1, 200 3, 073 3, 073	Cars 2, 405 4, 102 295 4, 070 5, 000 142 2, 653 279 1, 333 131 145 4, 028 891 1, 460 654 1, 302 3, 753 499	Cars 1, 416 1, 807 333 1, 774 3, 939 180 2, 664 294 1, 073 178 69 7, 081 1, 152 2, 244 1, 029 1, 163 663 4, 492 351	Cars 1, 854 3, 985 239 2, 988 5, 1942 2, 964 241 1, 492 1, 492 7, 232 731 4, 042 950 1, 417 686 4, 144 4, 1	Cars 1, 474 4, 228 1, 193 2, 203 6, 579 193 5, 499 21, 141 1, 762 100 12 6, 312 6, 312 730 4, 062 4, 062 147
Total	29, 472	20, 890	29, 760	29, 480	30, 796	31, 646	33, 062	35, 192	33, 326	40, 281	40, 067

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau near or agriculture reproducts. Computed from carriers and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in carlots include those by boat reduced to carlot basis.

Table 222.—Peaches: Total production, average price per bushel, and foreign trade of the United States, 1913-1931

		Price per		Domestic	exports, y	ear beginni	ngJuly 12
Year	Produc- tion	bushel, received by pro- ducers <sup>3</sup>	Farm value	Fresh	Dried	Canned 4	Total in terms of fresh
1913	1,000 bushels 39,707	Dollars	1,000 dollars	1,000 pounds	1,000 pounds 6,712	1,000 pounds	1,000 bushels 736
1914 1915 1916 1917					8, 188 5, 863		898 643
1918 1919 1919 1920	33, 094 50, 686 53, 178 45, 620	1.62 1.89 2.10	53, 637 100, 485 95, 970		4, 835 12, 756 3, 573		
1921 1922 1923 1924	32, 602 55, 852 45, 382	1.59 1.34 1.37	51, 739 74, 717 62, 025	<sup>8</sup> 611 18, 170 15, 065	6, 200 5, 586 12, 975	54, 624 50, 374	699 3, 163 8, 885
1924 1925 1926	53, 848 46, 562 69, 865	1. 26 1. 38 1. 00	68, 084 64, 171 68, 426	16, 172 15, 749 14, 453 17, 969	4, 668 3, 351 6, 968	57, 390 83, 160 81, 896	3, 240 4, 161 4, 477 4, 701
1927 1928 1929 1980	6 68, 369 45, 026 6 53, 864	1. 18 . 99 1. 35 . 89	50, 494 63, 643 60, 982 43, 825	17, 969 22, 067 19, 973 12, 859	6, 542 12, 436 3, 847 8, 482	86, 634 101, 438 74, 470 75, 763	4, 701 6, 050 3, 941 4, 355
1931 7	6 77, 743	.56	41, 377				

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board; italic figures are causus returns. Prices based upon returns from crop reporters. Estimates of production for 1929 and 1930 revised on basis of 1930 Cansus. Earlier years not so revised.

<sup>1</sup> Grop movement season extends from Mar. 1 of one year through June of the following year. <sup>2</sup> Preliminary.

<sup>1</sup>Dried peaches converted to terms of fresh on the basis that dried peaches equal 19 per cent of fresh.

1 Dried peaches converted to terms of fresh on the basis that dried peaches equal 19 per cent of fresh. Canned peaches converted to terms of fresh on the basis that 25 pounds of fresh equal 1 dozen cans of 1 pound each; 48 pounds fresh equals 1 bushel. In practice, 1 bushel of fresh fruit is figured as the equivalent of 2 dozen cans of 1 pound each.

2 Compiled from Commerce and Navigation of the United States, 1918-1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, 1918; Morthly Summary of Foreign Commerce of the United States, 1918; 1928, 3 purpose and 1922, 1927-1931.

3 From 1918 to 1922, Sept. 15 price; 1923-1925, Sept. 15 price in North, Aug. 15 price in South; 1926-1931, approximate average price for the season, as reported Dec. 1.

4 Canned peaches were reported in value only prior to July 1, 1922.

3 No exports reported prior to Jan. 1, 1922; figures for 1921 represent exports Jan. 1, 1922, to June 30, 1922.

4 Includes fruit not harvested as follows: 1926, 1,462,000 bushels in Georgia and northern States; 1927, 2,768,000 bushels in California; 1921, 8,063,000 bushels in California. Values are based on the quantity actually harvested plus a quantity of fruit that was sold but left on trees in 1930 and 1931.

Table 223.—Peaches: Production and seasonal form price, by States, 1925-1931

State and			P	roducti	on.			Se	asona	l farn	pric	e per	bushe	] 1
division	1925	1926	1927	1928	1929	1930	1931 2	1925	1926	1927	1928	1929	1930	1931
New Hampshire Massachusetts Rhode Island Connecticut New York New Jersey Pennsylvania	218 30 210 1, 920	213 37 255 2, 300 3, 000	140 23 186 1, 140 2, 304	189 27 239 2,400 1,625	131 29 154 1, 076 1, 990	32 249 1,580 1,340	153 41 210 1,700 2,200	2.50 3.00 2.80 1.90	1.80 1.70 1.70 .90	2. 10 2. 10 2. 20 1. 90 1. 50	2.30 2.30 1.90 1.45 1.35	1. 80 1. 15	lars 2.00 1.60 1.80 1.30 1.15 1.70	1. 25 1. 40 1. 40 . 65
North Atlantic	4, 752	8, 332	4,766	6, 372	4, 631	4, 435	7, 050	1.89	. 92	1.75	1.50	1. 53	1.48	. 69
Ohio	320 500 592 12 870	900 2, 660 1, 564 97 1, 722	1, 122 578 65 840 82	1, 638 1, 156 50 655	978 3, 320 998 77 864 52	780 9 24 25	1,470 4,300 1,935 117 1,500	2.30 2.50 2.20 2.50 1.80 2.35	1.60 1.25 1.00 1.60 1.25 1.50	2. 35 2. 05 2. 10 1. 95 1. 90 1. 60	1.60 1.40 1.55 1.50 1.55 2.00	1. 60 1. 35 1. 90 1. 50 1. 40 1. 65	2.00 1.65 1.70 1.95 1.90	.55 .50 .60 .90
North Central	3, 798	9, 379	4, 014	5, 936	7, 023	1, 185	12, 232	2.11	1. 26	2.00	1.52	1. 52	1.74	. 57
Delaware Maryland Virginia West Virginia North Carolina South Carolina Georgia Florida	240 362 100 1,500 740	700 1, 176 1, 000 2, 250 1, 054 9, 400	352 400 202 1, 300 615 5, 943	880 810 2,590 1,363 10,000	1, 058 489 1, 400 690 3, 700	300 270 122 1,800 1,190 5,500	800 1,600 1,030 3,128 1,784 9,134	1.85 1.90 2.20 1.60 1.35 1.40	.75 1.00 1.25 .90 1.00	1. 50 1. 60 2. 10 1. 70 1. 50 1. 35	1.30 1.40 1.50 1.15 1.10	1. 20 1. 00 1. 55 1. 40 1. 35 1. 15	1.50 1.60 1.80 1.35 1.35	.60 .60 .55 .65
South Atlantic.	10, 516	16, 155	9, 168	16, 320	8, 459	9,444	18, 068	1.46	.88	1.44	.97	1. 22	1. 26	. 59
Kentucky	1, 415 1, 312 712 2, 200 275 950	1,860 1,159 551	638 540 279 1, 628 86 760	2, 190 1, 350 635 8, 000 211 480	1, 325 505 560 1, 900 195 1, 116	600 1,105 638 84 142	2, 820 1, 530 1, 060 3, 600 352 400	1.55 1.60 1.55 1.50 2.00	1. 05 1. 10 1. 40 1. 05 1. 50 1. 30	1. 70 1. 50 1. 65 1. 40 1. 80 1. 30	1.10 1.45 1.20 1.60	1. 25 1. 30 1. 50 1. 20 1. 70	1. 35 1. 20 1. 46 1. 60 1. 75 1. 30	5 .50 65 75 75 1.05 1.05
South Central.	9, 184	9, 798	4, 911	10, 518	8, 204	3, 469	12, 623	1.54	1. 13	1. 51	1.21	1. 25	1.36	. 64
Idaho Colorado Arizona Utah Newada Washington Oregon California Clingstone Freestone	100	297 976 131 91 550 8 1, 222 384 22, 542 13, 625 8, 917	144 892 40 55 561 2 250 160 20, 500 13, 417 7, 083	17, 252 8, 500	109 68 604 6 1, 225 227 13, 334 7, 459 5, 875	10, 584	80 550 3 1, 050 224 24, 460 16, 751 7, 709	1. 90 1. 75 1. 70 2. 00 2. 25 1. 85 1. 86	1.10 1.80 1.70 .90 1.50 .90 1.20	1. 20 2. 20 2. 30 1. 20 2. 30 1. 75 1. 60	1. 20 1. 95 2. 00 . 95 2. 00 1. 40 . 55	1. 45 1. 80 1. 80 1. 00 2. 25 1. 35 1. 70 1. 36 1. 64	1. 45 1. 90 1. 80 1. 35 2. 00 1. 35 1. 15 . 54 . 66	50 1. 15 1. 45 . 50 2. 00 . 65 1. 10 . 43 . 39 . 50
Western		26, 201	22, 604			35, 331	27,770			. 68	==	1. 36	-	-
United States.	46, 562	4 69, 865	<sup>4</sup> 45, 463	<sup>4</sup> 68, 369	45, 026	<sup>4</sup> 53, 864	+77,743	1.38	1.00	1. 18	.99	1. 35	. 89	. 56

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board. Prices are based upon returns from crop reporters. Estimates of production for 1929 and 1930 revised on basis of 1930 Census. Earlier years not so revised.

<sup>&</sup>lt;sup>1</sup> In 1925, Sept. 15 price in North, Aug. 15 price in South; 1926-1931, approximate average price for the season as reported Dec. 1.

<sup>2</sup> Preliminary.

<sup>&</sup>lt;sup>3</sup> Crop failure.

<sup>•</sup> Crop lature. 4 Includes fruit not harvested as follows: 1926, 1,462,000 bushels in Georgia and Northern States; 1927, 2,708,000 bushels in California; 1928, 2,917,000 bushels in California and 1,000,000 bushels in Georgia; 1930, 10,638,000 bushels in California; 1931, 8,063,000 bushels in California. Values are based on the quantity actually harvested plus a quantity of fruit that was sold but left on trees in 1930 and 1931.

Table 224.—Peaches: Car-lot shipments, by State of origin, 1928-1931 and total United States shipments, 1921-1931 1

							1931	2		
State	1928	1929	1930	Total	May	June	July	Aug.	Sept.	Oct.
	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars
Massachusetts		5	3							
onnecticut	2	• 1	26	3					3	
lew York	1,744	865	2,310	988					849	13
lew Jersey	41	544	24	88				24	64	
ennsylvania	806	732	330	659				98	560	
)hio	426	2	98	122					122	
ndiana	398	676		561			1	461	99	
llino <b>i</b> s	1,975	4,637	(3)	5, 321			18	5, 196	107	
Michigan	514	312	183	259				2	257	
Missouri	2	56		82				82		
Vebraska		1								
Kansas		2								
Delaware	30	540	31	481				432	49	
Maryland	291	495	83	147				98	49	
/ircinia		623	19	445			2	416	27	
West Virginia		246	32	122				52	70	
North Carolina	3 242	1, 250	2, 172	2, 564		27	841	1,696	1 ''	
South Carolina	285	602	747	848		39	247	562		
Peorgla		5, 298		13, 448	34	1,655	8, 812	2,947		
florida	10, 520	0, 200	0,020	20, 220	V-2	-, 500	0,022	-,		
Kentucky		60		217			î	216		
Fennessee		1.144	256	1,364		1	17	1.346		
Vabama.	325	81	42	232		35	140	57		
Mississippi		60	7	119	ī	23	85	10		
Arkansas		2,679	41	4, 203	1	65	1,823	2,315		i
Louisiana	2,010	12,079	2	13		00	13	2,010		
Oklahoma	17	121	-	4			10	4		
	278	569	21	143		16	123	4		
Texas		135	1	31		10	120	14	17	
daho	135					~~~~				
Colorado		1,765	1,369	1,503				660	834	1
New Mexico		1 - 8								
Utah	694	550	341	215				. 2	213	
Washington		1,554	609	912			5	613	291	1
Oregon	. 76	51	48	28				3	22	1
California	. 19, 589	9,780	21,072	10, 958	12	180	3, 563	6, 466	737	<b> </b>

## TOTAL, ALL STATES

Year	May	June	July	Aug.	Sept.	Oct.	Total
1921 1922 1923 1924 1925 1920 1927 1928 1929 1930	Cars 1, 325 695 1 28 328 52 267 12 106 18 47	Cars 4, 005 3, 189 2, 384 1, 873 4, 951 2, 209 5, 638 1, 755 2, 374 2, 515 2, 041	Cars 9, 544 7, 598 10, 903 14, 603 17, 932 21, 793 12, 675 23, 122 10, 429 12, 956 15, 691	Cars 7, 381 11, 928 9, 757 13, 781 9, 921 24, 538 13, 217 22, 819 14, 012 15, 526 23, 776	Cars 5, 035 13, 779 9, 654 7, 889 7, 420 8, 847 9, 739 8, 802 8, 308 7, 333 4, 370	Cars 44 1, 216 706 41, 323 306 51, 026 178 462 222 142 155	Cars 27, 33- 38, 40; 33, 52; 89, 49; 40, 85; 58, 46, 41, 71; 56, 97; 35, 45 38, 49; 46, 08;

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis. Shipments by truck not included in this table. See 1927 Yearbook, p. 855, for data for earlier years.

Crop movement season extends from May 1 through October of a given year.
 Preliminery.
 No shipments in 1930 because of frost killing.
 Includes 1 car in November.
 Includes 5 cars in November

Table 225.—Pears: Total production, foreign trade of the United States, and average price per bushel, 1913-1931

		Price per bushel		Domestic	exports, y	ear beginn	ing July 1
Year	Produc- tion	received by pro- ducers 2	Farm value	Fresh <sup>2</sup>	Canned 3	Dried	Total in terms of fresh
1913	1,000 bushels 10, 108	Dollars	1,000 dollars	1,000 pounds	1,000 pounds	1,000 pounds	1,000 bushels
1914 1915 1916 1917 1918 1919 1919 1919 1920 1921 1922 1923 1924 1926 1926 1927 1928	12, 086 11, 216 11, 374 13, 281 13, 362 14, 20, 4 15, 006 16, 805 11, 297 20, 705 17, 845 18, 866 20, 720 25, 249 18, 373 24, 212 21, 172 21, 172 22, 540	1. 38 1. 84 1. 66 1. 71 1. 06 1. 21 1. 42 1. 40 . 89 1. 32 1. 02 1. 43 2. 75	18, 419 27, 614 27, 865 19, 268 21, 943 21, 570 26, 689 29, 066 22, 399 24, 298 24, 663 30, 202 18, 158		49, 358 38, 431 53, 851		2, 823 2, 648 3, 107
1931 6	<sup>8</sup> 23, 009	-60	13, 567				

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board: italic figures are census returns. Prices are based upon returns from crop reporters. Estimates of production for 1929 and 1930 revised on basis of 1930 Census. Earlier years not so revised.

Dec. 1.

Table 226.—Pears: Car-lot shipments, by State of origin, 1921-22 to 1930-31

## Crop-movement season 1

State										
	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31 *
										<u> </u>
	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars
New York	2, 893	5,461	1,701	2,978	4, 510	2, 263	1,694	1,590	547	2,661
New Jersey	23	40	76	60	52	47	19	16	4	19
Ohio	17	96	33	47	62	100	130	104	33	77
Illinois	17 33	468	318	595	614	858	228	370	787	154
Michigan	653	1,860	543	394	151	457	536	449	147	469
Delaware		151	541	273	128	249	49	1	20	13
Maryland	3	86 79	68	30	29	33	32	27	42	9
Alabama	38	79	60	27	66	12	93	71	152	135
Texas	115	50	99	129	121	144	213	39	231	100
Colorado	745	774	696	955	717	750	737	264	1, 082	249
Utah	33	82	65	81	29	77	34	49	47	38
Washington	2, 903	2,678	4, 274	2,456	3, 560	5, 278	2,589	5,868	4, 035	6, 157
Oregon	985	1,862	2, 575	1, 483	2, 225	2,909	2,977	4,437	4, 211	5, 116
California	4,500	6,465	7, 143	6, 312	8,718	11,673	9,215	11,003	9, 465	* 13, 491
Other States	112	279	402	426	275	359	198	146	344	133
Total	13, 053	20, 381	18, 589	16, 246	21, 257	25, 209	18, 744	24, 434	21, 147	28, 821

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

2 Preliminary.

<sup>&</sup>lt;sup>1</sup> Canned pears converted to terms of fresh on the basis that 1 pound canned fruit is equivalent to 2 pounds fresh; dried pears converted to terms of fresh on the basis that dried pears equal 25 per cent of fresh; 48 pounds fresh equals 1 bushel. No imports of pears reported.

<sup>2</sup> From 1918 to 1925, Nov. 15 price; 1928 to 1931, approximate average price for the season as reported

 <sup>5</sup> Exports were reported in value only, prior to July 1, 1922.
 4 January-June, 1929. Not previously reported.
 5 Includes some quantities not harvested on account of market conditions (1,292,000 bushels in 1930 and 488,000 in 1931). Prices and value are computed on harvested crop.
 6 Preliminary.

<sup>1</sup> Crop movement season extends from June of one year through May of the following year.

Includes 1 car in May, 1930, and 20 cars in June, 1931.

Table 227.—Pears: Production and seasonal farm price, by States, 1925-1931

			P	roduct	ion	-		Se	asona	l farm	pric	per	bushe	1
State and division	1925	1926	1927	1928	1929	1930	1931 2	1925	1926	1927	1928	1929	1930	1931
Maine	12 90 13 60	12 57	420 400	502 620	16 13 12 59 8 22 715 73 195	1,000 bush. 12 13 9 74 9 1,935 104 438	1,000 bush. 13 12 11 46 7 18 805 96 448	1.75	1.65 2.00 1.80 1.60 1.90 1.25	1.70 2.15 1.75 1.80 2.00 1.50	1.70 2.10 1.70 1.80 1.60 1.45 1.00	1.95 1.80 2.00	1.50 1.60 1.20 1.25 1.15 .90	1.50 1.30 1.30
North Atlantic	4, 232	3, 632	2,878	3, 052	1, 113	2, 623	1, 456	1. 58	1. 15	1.45	1.34	1.78	. 96	.84
Ohio Indiana Illinois Michigan Wisconsin	354 209 540 450 15	818 889	250 140 812 702	395 288 540 819	204 185 600 346	220 111 265 602	510 2 <del>41</del> 765 450	1. 25 1. 00 1. 20 1. 15 1. 50	. 85 . 65 . 75 . 80	1.05 1.10	. 90 . 75 . 85 . 95	.85	1. 15 . 90 . 95 1. 05	.45
Iowa Missouri Nebraska Kansas	45 342 18 165	68 473 29 186	270 36 258	47 171 12 51	93 447 53 256	59 177 36 118	93 539 35 220	1.70 1.20 2.00	.80 1.60	1. 15 1. 60	1. 15 1. 90	. 95 1. 50	1.55	1.00
North Central	2, 138	3, 221	2,009	2, 323	2, 184	1, 588	2, 856	1. 22	. 82	1, 19	. 93	1.08	1, 08	. 54
Delaware. Maryland. Virginia. West Virginia. North Carolina. South Carolina. Georgia. Florida.	280 135 34 158 87 155 54		128 193 130 12 100 68 104 44	230 63 234 133	33 115 402 65 205 89 155 45	20 81 100 24 115 87 155 49	39 149 510 129 323 118 204 59	1.30 1.70 1.70 1.50 1.50	1. 15 1. 20 1. 05	1. 15 1. 65 1. 35 1. 30 1. 35	1. 05 1. 25 1. 10 1. 10 1. 00	.90 1.40 1.20 1.25 1.05	1.35 1.70 1.30 1.15 1.05	.50 .70 .70 .75
South Atlantic		2, 018	779	1, 258	1, 109	631	1, 531	1. 29	. 81	1.07	1.00	1. 02	1. 14	. 60
Kentucky Tennessee Alabama Mississippi Arkansas Louisiana Oklahoma Texas	148	266 211 189 116 71 81	34 125 83 120 70 50 130 345	234 194 102 69 72	256 276 225 173 150 64 811 510	58 142 316 212 94 62 66 392	300 335 357 263 210 82 95 400	1. 50 1. 40 1. 30 1. 45 1. 45 1. 60	1. 15 1. 15 1. 30 1. 40	1.45 1.30 1.10 1.30 1.40 1.30	1. 10 1. 10 1. 20 1. 35 1. 30	1. 05 1. 15 1. 05 1. 20 1. 35 1. 05	1. 15 1. 00 . 95 1. 30 1. 30 1. 50	. 55 . 65 . 60 . 55 . 90
South Central	1, 274	1, 658	957	1, 432	1, 965	1, 342	2,042	1.41	1. 02	1. 29	1. 16	1.06	1.10	. 65
Idaho Colorado New Mexico Arizona Utah Nevada Washington Oregon California	25 7 2,300 1,500 7,542	42 15 80 6 3, 220 2, 100 8, 625		185 27 15 87 6 3,700 2,700 9,355		71 146 28 14 95 5 4,463 3,200 311,334	3, 650 1, 995 8, 917	1. 15 1. 70 2. 20 1. 75 2. 00 1. 70 1. 60	1. 50 2. 50 1. 10 2. 00 .80	1.40 1.70 2.50 1.70 2.50 1.35 1.40	1. 05 1. 55 2. 50 1. 40 2. 50 1. 05 1. 05	1. 50 1. 40 2. 45 1. 50 2. 55 1. 35 1. 40	1.30 1.45 2.10 1.25 2.20 .75	.60 .80 1.35 1.20 2.00 .50
Western							L	1		1. 33	.90	1. 53	.60	. 58
United States	20, 720	25, 249	18, 373	24, 212	21, 172	<sup>3</sup> 25, 540	<sup>2</sup> 23, 009	1.40	.89	1. 32	1. 02	1, 43	.78	. 60

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board. Prices are based upon returns from crop reporters. Estimates of production for 1929 and 1930 revised on basis of 1930 census. Earlier years not so revised.

<sup>&</sup>lt;sup>1</sup>In 1925, Nov. 15 price; 1926–1931, approximate average price for the season as reported Dec. 1.

<sup>1</sup>Preliminary.

<sup>1</sup>Includes some quantities not harvested on account of market conditions (1,292,000 bushels in 1930 and 458,000 in 1931.) Prices and value computed on harvested crop.

Table 228.—Peas, green, commercial crop: Acreage, production, and price per bushel or per 1,000 pounds 1928-1931

Utilization and		Acr	eage			Produ	etion		Seas	onal fa	rm pri	ce
State	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
For market	Acres 60, 300	Acres 68, 020	Acres 83, 980	Acres 88, 550	1,000 bush.1 5,095	1,000 bush. <sup>1</sup> 5,681	1,000 bush.1 7,006	1,000 bush.1 6,317	Dolls. 1. 71	Dolls. 1, 69	Dolls. 1. 42	
For manufacture 1 Maine.  Maine. New York. New Jersey. Pennsylvania. Ohio. Indiana. Illinois.	1, 680 4, 020 5, 290 8, 740	32,800 400 1,730 5,030 5,500 11,010	34, 440 600 2, 010 5, 410 6, 270 12, 660	31, 900 500 1, 920 5, 800 5, 950	lbs. 1, 980 48, 815 770 3, 063 6, 030 9, 797 15, 356	1,840 39,360 800 4,325 7,545 9,350 18,056	lbs. 2, 992 75, 768 300 1, 809 4, 598 13, 857 27, 852	lbs. 2, 102 41, 151 715 2, 918 8, 932 15, 827 21, 877	3. 0 4. 0 3. 0 2. 7 2. 0	3. 0 3. 5 3. 0 2. 4 2. 6 2. 5	3. 1 3. 5 3. 0 2. 2 2. 6 3. 0	2.7 3.0 2.7 2.1 2.5 2.9
Michigan Wisconsin Minnesota Delaware Maryland Montana Colorado Utah	8, 500 101, 000 7, 920 2, 060 10, 500 3, 500 3, 000 10, 150	111, 000 12, 670 3, 040 12, 400 8, 900 3, 400	127, 000 17, 900 3, 200 13, 000 3, 500 3, 700	98, 000 16, 500 2, 620 13, 860 2, 400 8, 500	203, 616 16, 347 3, 529	205, 350 21, 184 6, 536 27, 900 7, 254 6, 038	229, 870 30, 967 1, 056 6, 500 8, 190 6, 734	107, 800 15, 520 4, 795 22, 730 6, 000 5, 180	3.0 2.0 3.0 3.0 2.5 2.5	3. 0 2. 7 3. 0 2. 5 2. 2	2, 9 2, 7 3, 0 3, 0 2, 3 2, 3	2.7 3.0 2.8 2.0 2.3
Washington 3 California_ Other States 4	1, 100 4, 850	1,940 880	2, 100 950	2,000 1,000	2, 420	4, 268 799	5, 250 2, 508	2.400	2,8	3. 0 3. 0	3. 0 3. 0	2.5 3.0
Total for manufacture	205, 960	232, 920	263, 900	222, 510	393, 381	407, 056	483, 967	293, 517	2.8	2, 9	2. 9	2.7

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters and canning establishments.

Bushels containing approximately 32 pounds, unshelled.
 Reported on shelled basis.
 Included in other States prior to 1929.
 Other States include Idaho, Iowa, Kansas, Tennessee, Virginia, and Wyoming.

Table 229.—Peas, green: Car-lot shipments by State of origin, 1925-1931

#### Crop movement season 1 STATE 1931 3 Cars Care Cars. Cars Cars Cars Cars New York..... New Jersey..... Maryland..... 1, 110 28 54 14 Virginia North Carolina South Carolina 491 104 149 596 685 249 244 207 233 234 101 Mississippi.... Idaho. Colorado Washington California 125 109 1,529 2, 177 .000 3.628Other States !.... 4, 688 2,356 3, 622 4, 146 5, 160 6,800 7, 167

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

<sup>&</sup>lt;sup>1</sup> Crop movement season is for calendar year except for Imperial Valley, California; Florida; and Texas which begins in October of the preceding year.

which begins in October of the preceding year.

2 Preliminary.

3 Figures for certain States include shipments in preceding year as follows: California, 1926, 4 cars in October, 220 in November, and 94 in December; 1927, 1 car in October, 223 in November, and 38 in December; 1928, 202 cars in November and 92 in December; 1929, 250 cars in November and 148 in December, 1930, 4 cars in October, 188 in November, and 223 in December; 1931, 22 cars in October, 737 in November; and 170 in December. Florida, 1927, 2 cars in December; 1928, 5 cars in November and 4 in December; 1929, 1 car in December; 1931, 1 car in December. Texas, 1927, 1 car in December; 1928, 1 car in November.

Table 230.—Peas, canned: Pack 1 in the United States, 1918-1931

Q+-4-							Sea	son						
State	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
New York_New Jersey 2_Ohlo	1,000 cases 2,000 332 442 454 978 477 4,520 	248 306 381 433 425 4, 317	549 282 271 460 549 5, 804 696 595 328	345 241 182 331 4, 063 533 876 84	153 225 268 516 455 7,042 	199 384 367 586 392	331 430 483 697 710, 390 470 873 830 282	257 232 86 357 451 10, 003 432 956 1, 346	143 278 500 680 723 9, 287 446 840 1, 029 222	267 205 90 563 399 6, 549 497 986	242 336 427 617 542 9, 248 722 1, 030 1, 154	383 337 404 767 558 9, 399 926 1, 469 1, 241 (4)	74 208 564 1,560 880 10,492 1,333 400 1,662	208 398 711 1, 003 434 5, 057 617 1, 243 676
ບ. ສ	11, 063	8, 685	12, 317	8, 207	18, 042	13, 948	19, 315			12, 936	<u> </u>	18, 530	22, 035	13, 286

Bureau of Agricultural Economics. Compiled from National Canners' Association, 1918-1926; Bureau of Census, 1927-1929; beginning 1930, Foodstuffs Division, Bureau of Foreign and Domestic Commerce.

Table 231.—Pecan trees: Number in specified States, by age groups, 1989 1

			Improved	varieties <sup>2</sup>		
State	Planted in 1929	1 to 4 years	5 to 9 years	10 to 14 years	15 to 19 years	20 to 24 years
North Carolina South Carolina Georgia Florida Alabama Arkansas Mississippi Louisiana Oklahoma Tenas Total, 11 States	22, 300 10, 000 109, 000 12, 000 49, 000 30, 400 23, 400 9, 280 100, 000 63, 400	131, 100 157, 000 1, 014, 000 156, 000 250, 000 205, 700 87, 350 385, 000 2, 895, 950	47, 400 64, 000 919, 000 175, 000 232, 000 31, 700 142, 300 46, 307 30, 000 67, 300	33, 500 44, 000 697, 000 119, 000 143, 000 20, 800 131, 300 33, 743 5, 000 28, 400	30, 700 30, 000 482, 000 60, 000 188, 000 14, 500 80, 000 56, 518	7, 300 13, 000 130, 000 75, 000 18, 000 3, 500 24, 300 32, 899
	Imp	roved variet	ies ²		Seedlings 3	
State	25 to 29 years	30 years and over	Total	Nonbear- ing age	Seedlings 3  Bearing age	Total
Missouri North Carolina South Carolina Georgia Ffordia Alabama Arkansas Mississippi Louisiana Oklahoma Texas Total, 11 States	25 to 29	30 years			Bearing	Total  445, 000 41, 000 25, 000 90, 000 65, 000 47, 000 585, 800 531, 000 2, 400, 000 10, 552, 800

Bureau of Agricultural Economics.

<sup>&</sup>lt;sup>1</sup> Stated in cases of 21 No. 2 cans. <sup>2</sup> Includes Delaware.

Previous to 1923, included in "Other States."
Included in "Other States."

Estimate based upon age distribution shown by 1929 survey supplemented by number of trees of bearing age and nonbearing age reported by the census of 1925.
 Improved trees are those that have been grafted, budded, or top worked with scions or buds of improved varieties.
 Seedling trees are those grown from the seed, including native wild trees.

Table 232.—Pecans: Estimated production and December 1 price, by States, 1927-1931

							P	roduct	ion						
State		Impro	ved v	arietie	8		Seedli	ng var	ieties				Total		
	1927	1928	1929	1930	1931 1	1927	1928	1929	1930	1931 ¹	1927	1928	1929	1930	19311
III Mo N. C S. C Ga Fla Ala Miss Ark La Okia Tex	1,000 108. 0 5 427 902 2,927 1,255 1,120 60 398 23 192	3, 300 95 750 20	476 3, 560 648 1, 345 1, 196 45 375 74	lbs. 0 12 384 767 3, 960 770 2, 320 2, 816 84 880 84	785 785 7, 820 1, 760 3, 080 2, 700 168 840 115	255 476 343 354 2, 080 1, 440 2, 253 4, 663	840 500 500 3,000 1,600 4,250 4,420	216 275 1, 104 705 2, 125 14, 826	589 216 157 440 230 410 2,399 1,316 4,620	1, 960 315 150 680 440 2, 300	498 711 1, 157 3, 403 1, 144 1, 609 3, 200 1, 500 2, 651 4, 686	7,600 2,000 3,000 6,300 1,695 5,000 4,440	900 664 580 4,000 864 1,620 2,300 750 2,500	600 600 924 4, 400 1, 000 2, 730 5, 215 1, 400 5, 500	2,000 1,050 935 8,500 2,200 3,500 5,000
v. s	8, 110	16, 988	8, 814	12, 434	19, 003	22, 134	42, 637	42, 574	34, 03	55, 982	30, 244	59, 625	51, 888	46, 469	74, 98
			EST	IMAT	red i	RICE	PER	POU	ND I	DECE	MBE	R 1			
III Mo N. C S. C	Cts. 48. 0	36.0	34.0	33.0	20.0	27.0	16.0 22.0	13. 0 20. 0	12.0	8.0	20. 3 34. 9	16. 5 30. 6	13. 3 28. 6	12. 27.	8.2

m	Cts.	Cts.	Cts.	Cts.	Cts.	Cts. 14.0	Cts. 15.0	Cts. 15. 0 13. 0	Cts. 14. 0	Cts. 8. 0 8. 0	Cts. 14. 0 20. 3	Cts. 15. 0	Cts. 15.0	Cts. 14, 0	Cts. 8.0
Mo	48.0	35.0			15.0	20.0	16.0	13.0	12.0	8. 0	20. 3	16. 5		12.2	8.2
N. C	40.0	36.0	34.0		20.0			20.0	18.0		34. 9	30. 6		27.7	18. 2
S. C	35. 0			28.0	17.0	23.0	17.0				32.4	30. 1	32.4	26. 3	15.9
Ga	34.0			30.0					14.0	6.0	31. 6	26. 3	29. 2	28.4	11.5
Fla	33.0					17.0	16.0		17. 0		28. 1	27. 2	29.1	26. 2	12.8
Ala	37. 0	30.0		25.0				16.0	12.0	8.0	33. 3	27. 2	27.7	23.0	13. 3
Miss	38.0	30.0	32.0	27.0			14.0	17.0				22. 4		20.1	10.8
Ark	35.0	32,0	35.0	30.0			14.0				15. 8			13.1	6.5
La	38. 0	27.0	31.0	24.0	16.0	16.0	10.7	15.0	12.0	7. 5	19. 3	13. 1	17.4		
Okle	35. 0				19.0	13.0	11.0	10.2	9.1	5.0	13. 1	11.1	10.3		
Tex	85. 0	35. 0			17. 0	16.0	11.7	11.0	11.0	5. 3	16. 4	12. 4	11.6	11.5	5, 6
T. S	35. 6	29. 7	31. 7	27.8	13. 8	16.0	12.0	11. 3	10.8	5. 7	21. 2	17. 0	14.8	15. 3	7.8

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

Table 233.—Plums and prunes: Production and seasonal farm price, by States, 1926-1931

			Drod	uction				Qoo	sonal f	0 mm m	rico	
Crop and State				demon.				, , ,	SULIAL			
Clop and Succe	1926	1927	1928	1929	1930	1931 1	1926	1927	1928	1929	1930	1931
	~	~	~	~	~	~		7-				
Plums and fresh	Short	Short tons	Short	Short tons	Short tons -	Short tons	Dol- lars	Dol- lars	Dol- lars	Doi-	Dol-	Doi-
California	71,000			40,000	82, 000	8 65, 000	25.00	45.00	37.00	90, 00	35.00	24, 00
Oregon	17, 500	18, 100	25, 300		25,000	21, 500		20.00			20.00	
Washington Idaho	11, 300 19, 600	9, 300 21, 600			18, 875 22, 000	11, 750 19, 500	27.00	25.00 27.00			22.00 24.00	
10970	18, 000	21,000	21, 100	20,000	24,000	18, 000	30.00	27.00	30.00	22.00	2/2.00	21.00
Total	119,400	106, 000	132, 500	117, 250	147, 875	117, 750	26.01	35.31	32. 24	45. 90	29. 17	22. 29
Prunes, dried:												
California	150, 000	225, 000	220, 300	103, 000	3 267,000	173, 000	100.00	70.00	100.00	155.00	55.00	58. 00
Oregon	34,000	16,000	5,000	50,000	3 25, 500	27,000	95, 00	90.00	160,00	140.00	170. OC	175. O
Washington	6, 250	3, 500		7,500	3,750		95.00	95.00	160.00			
Idaho			84	880	215				100.00	130.00	00. UC	
Total	190, 250	244, 500	226, 284	161, 380	3 296,468	203.750	98.9	171.67	101. 58	149. 5	56. 16	360. 5

Bureau of Agricultural Economics.

<sup>&</sup>lt;sup>1</sup> Preliminary.

<sup>&</sup>lt;sup>1</sup> Preliminary.

Seasonal average to Dec. 1.
 Isosonal average to Dec. 1.
 Includes some fruit not harvested on account of market conditions (but not included in computing value) as follows: Plums and fresh prunes, California, 1931, 6,000 tons; prunes, dried, California, 1930, 13,000 tons, Oregon, 1930, 8,000 tons.

Table 234 .- Potatoes: Acreage, production, value, exports, etc., United States, 1909-1931

Year	Acreage	Average yield per acre	Produc- tion	Price per bushel received by pro- ducers Dec. 1	Farm value Dec. 1	Whole- sale price per bushel at New York <sup>1</sup>	Domes- tic ex- ports, year be- ginning July :	Imports year be- ginning July <sup>2</sup>	Net bal- ance, year be- ginning July 28
1909	1,000 acres 3,669	Bushels 108, 1	1,000 bushels 389, 195	Cents	1,000 dollars	Cents	1,000 bushels	1,000 bushels	1,200 bushels
1909	3, 669 3, 720 3, 619 3, 711 3, 668 3, 711 3, 734 3, 584 4, 295	100.1 107.5 93.8 80.9 113.4 90.4 110.5 96.3 80.5 100.5	394, 552 349, 032 292, 737 420, 647 331, 525 409, 921 359, 721 286, 953 442, 108 411, 860	54. 2 55. 7 70. 9 50. 5 68. 7 48. 7 61. 7 146. 1 122. 8 119. 3	213, 679 194, 586 233, 778 212, 550 227, 903 199, 460 221, 992 419, 333 542, 774 491, 527	49 54 106 62 78 47 103 238 129 127	999 2, 384 1, 237 2, 028 1, 794 3, 135 4, 018 2, 489 3, 453 3, 689	353 219 13, 735 337 3, 646 271 210 3, 079 1, 180 3, 534	+646 +2,177 -12,283 +1,6,8 -1,823 +2,866 +3,810 -558 +2,273 +205
1919 1919 1920 1921 1922 1922 1923	3, 302 3, 598 3, 943 3, 384	90.7 112.5 91.0 106.4 108.6 121.1	298, 975 371, 356 327, 365 419, 655 367, 534 852, 462	158. 0 112. 8 108. 1 55. 7 75. 7	472, 289 418, 926 353, 803 233, 909 278, 251	284 103 123 97 118	3, 723 4, 803 2, 327 2, 980 3, 075	6, 941 3, 423 2, 110 572 564	-3, 212 +1, 390 +222 +2, 408 +2, 512
1924 1925 1926 1927 1928 1929 1920 1930	3, 111 2, 825 2, 817 3, 177 3, 474 2, 978 3, 038	124. 1 105. 9 114. 7 116. 6 122. 8 110. 5 109. 7 111. 3	386, 219 299, 072 323, 085 370, 423 428, 776 329, 134 333, 210 376, 248	62.3 187.2 4 141.3 4 95.1 4 52.7 4 128.8 4 89.0 4 42.9	240, 757 559, 939 458, 601 352, 375 224, 859 423, 896 296, 505 161, 264	78 238 161 129 76 163 111	3, 653 1, 824 2, 092 2, 424 3, 165 2, 386 1, 548	478 5, 420 6, 349 3, 803 2, 698 6, 006 5, 729	+3, 187 -3, 575 -4, 205 -1, 313 +528 -3, 521 -4, 155

Bureau of Agricultural Economics. Acreage, yield, and production figures are estimates of the crop reporting board, revised, 1919 to 1928. See introductory text; italic figures are census returns. Prices received by producers are based upon returns from crop reporters. See 1927 Yearbook, p. 881, for data for earlier years.

¹Compiled from Producers Price Current. Prices 1909-1919 are averages of the high and low weekly quotations of New York potatoes, October-June, converted from dollars per 180 pounds to cents per bushel; beginning 1920, season September-May.
²Compiled from Commerce and Navigation of the United States, 1999-1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June issues, 1919-1926, January and June issues, 1927-1930 and official records of the Bureau of Foreign and Domestic Commerce.
³The difference between total exports (domestic exports plus recovered) and total impacts. Line impacts.

Table 235.—Potatoes: Car-lot shipments, United States, by months, 1921-1931

Year	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1921 1922 1923 1924 1925 1926 1927 1928 1929 1930 1931	Cars 14, 477 16, 721 17, 262 19, 762 21, 715 16, 185 17, 974 20, 278 20, 096 20, 302 21, 241	20, 718 20, 394 14, 834 17, 784 22, 913 20, 472 19, 918	22, 940 21, 639 19, 974 21, 497 23, 710 23, 059 22, 108	23, 199 19, 461 20, 123 14, 238 20, 283 17, 255 20, 153 19, 769	18, 736 20, 215 16, 903 16, 691 23, 740 20, 360 22, 803	22, 104 20, 295 20, 845 19, 798 23, 587 22, 155 29, 675 24, 813 25, 004	18, 833 16, 733 23, 626 17, 765 20, 310 21, 053 21, 048 19, 583 22, 326	18, 239 16, 735 16, 394 14, 864 15, 327 17, 853 16, 252 17, 395 16, 775	24, 420 24, 063 21, 387 23, 569 22, 978 25, 003 21, 127 24, 441 22, 415	35, 193 35, 223 34, 141 33, 631 36, 182 38, 333 29, 906 31, 958 29, 076	21, 050 20, 737 20, 852 16, 286 18, 419 21, 124 18, 232 15, 706 16, 502	12, 448 11, 977 13, 237 11, 524 13, 487 13, 695 13, 207 15, 158 15, 413	Cars 218, 001 245, 407 241, 003 252, 097 241, 523 232, 424 253, 445 257, 343 253, 194 252, 411 239, 913

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis, 400 to 700 bushels to a carload.

<sup>&</sup>lt;sup>3</sup>The difference between total exports (domestic exports plus reexports) and total imports; + indicates net exports and - indicates net imports.

<sup>4</sup> For some of the early and midseason States prices represent approximate seasonal average.

<sup>5</sup> Preliminary.

<sup>&</sup>lt;sup>1</sup> Preliminary.

Table 236.—Potatoes: Acreage and production, by States, average 1924-1928, annual 1928-1931

			Wieles	000 IOD	0 1001					
			Acreage				Pr	oduction	1	
State and division	Aver- age 1924- 1928	1928	1929	1930	1931 1	Aver- age 1924- 1928	1928	1929	1930	19311
Maine	1,000 acres 148 10 19 14 2 14 245 53 200	1,000 acres 179 10 17 14 2 12 232 47 210	1,000 acres 171 8 15 11 2 11 213 38 195	1,000 acres 181 9 15 11 12 11 198 87 189	1,000 acres 198 9 17 13 2 12 202 41 191	1,000 bush. 37, 684 1, 278 2, 254 1, 501 244 1, 554 28, 363 7, 475 22, 872	1,000 bush. 39,380 1,100 2,040 1,260 220 1,380 27,608 7,755 26,670	1,000 bush. 49,932 1,160 1,875 1,155 254 1,287 21,513 4,902 20,865	1,000 bush. 45, 250 1, 665 2, 475 1, 870 380 1, 925 23, 364 7, 511 17, 955	1,000 bush. 50,960 1,485 2,550 1,625 300 1,920 28,684 7,831 26,549
North Atlantic	704	723	664	653	683	103, 224	107, 413	102, 943	102, 395	121, 904
Ohio	54 96 52	119 55 53 271 273 379 81 59 123 60 119 50	105 50 47 225 215 330 77 50 121 56 101	105 51 50 227 239 314 70 48 97 58 101	110 58 55 250 268 361 81 49 114 54 131	10, 285 4, 536 4, 765 26, 510 26, 308 33, 855 7, 588 4, 776 8, 422 4, 594 7, 969 4, 931	11, 424 5, 775 5, 830 31, 436 30, 576 41, 311 10, 368 7, 139 12, 177 5, 760 10, 829 7, 500	10, 080 4, 200 3, 948 15, 975 20, 640 25, 740 7, 700 3, 950 6, 776 4, 200 9, 393 8, 960	9, 240 4, 539 3, 900 14, 301 18, 164 22, 608 4, 900 4, 848 6, 305 3, 654 9, 595 4, 788	11, 220 4, 930 4, 675 23, 750 24, 924 28, 890 4, 455 8, 676 8, 436 2, 160 6, 812 3, 634
North Central	1, 436	1,642	1, 421	1, 402	1, 577	144, 538	180, 125	116, 562	106, 842	127, 551
Delaware Maryland Virginia West Virginia North Carolina South Carolina Florida	. 61 26	5 36 121 38 83 29 14 82	4 30 103 36 62 20 13 23	4 30 117 38 76 21 15 82	5 32 118 40 79 25 18 28	471 3,664 15,357 3,540 6,136 3,019 761 3,056	470 4,320 18,876 4,560 9,379 3,451 924 4,000	344 3, 390 15, 244 3, 780 6, 138 2, 600 884 2, 714	200 2, 520 13, 689 2, 394 7, 220 2, 835 1, 065 2, 560	540 3, 350 14, 160 3, 200 8, 532 3, 550 1, 224 3, 640
South Atlantic	318	858	291	833	845	38,004	45, 980	35, 094	32, 483	38, 206
Kentucky	48 38 26 9 30 32 39 36	56 43 81 10 36 38 52 48	49 39 22 9 29 29 39 42	44 41 28 9 31 34 38 57	55 57 39 14 43 48 45 67	4, 442 2, 897 1, 925 603 2, 053 1, 900 2, 875 2, 379	6, 440 3, 784 2, 356 790 2, 844 2, 546 3, 744 3, 072	4, 655 3, 159 1, 694 702 2, 494 1, 653 2, 925 2, 982	2, 772 2, 419 2, 184 594 2, 697 2, 316 3, 496 4, 788	3, 960 3, 021 3, 666 1, 134 3, 784 8, 936 3, 240 4, 891
South Central	257	314	258	282	368	19,074	25, 576	20, 264	21, 296	27, 632
Montana Idaho Wyoming Colorado New Mexico Arizona Utah Nevada Washington Oregon California	84 15 85 3 13 5 53	23 104 22 114 4 3 14 5 5 54 41 58	21 82 20 90 4 2 11 4 44 33 83	18 98 23 92 5 3 12 3 48 83 83	19 110 32 101 5 8 15 3 41 42 35	2, 343 16, 503 1, 686 13, 511 190 219 1, 832 684 9, 144 4, 108 8, 056	2, 645 19, 136 2, 310 17, 670 280 222 2, 016 700 9, 180 5, 043 8, 480	1, 869 15, 416 1, 840 14, 670 320 170 2, 035 560 7, 260 7, 260 8, 366 6, 765	1, 764 24, 500 3, 450 17, 480 350 255 2, 160 510 7, 680 5, 115 6, 930	1, 805 24, 200 3, 360 9, 595 385 255 1, 950 300 6, 820 5, 460 6, 825
	000	437	844	388	409	58, 275	67, 682	54, 271	70, 194	60, 955
Western	366	201	022	- 000			-	حند ا		

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

<sup>&</sup>lt;sup>1</sup>Preliminary.

Table 237.—Potatoes: Yield per acre and estimated price per bushel December 1. by States, averages, and annual 1926-1931

1928   Bush. Bush. Bush. Bush. Bush. Bush. Bush. Bush. Bush. Cts. Cts. Cts. Cts. Cts. Cts. Naw Hampshire.   120   130   125   110   145   185   165   187   170   140   80   160   180	1930 Cts. 65 105 90 110 115 115	1931 Cts. 20 60
1919   1928   1927   1928   1929   1930   1931   1925   1926   1927   1928   1929   1920	Cts. 65 105 90 110 115 115	Cts. 20
New Hampshire	65 105 90 110 115	20 60
Connecticut     111     130     90     115     117     175     160     173     180     165     90     180       New York     114     120     112     119     101     118     142     142     140     125     65     145       New Jersey     136     145     161     165     129     203     191     141     185     110     50     160       Pennsylvania     106     107     110     127     107     95     139     142     170     120     65     160	90 95 115	50 65 65 65 40 60 45
North Atlantic. 138. 1 151. 7 141. 8 148. 6 155. 0 156. 8 178. 5 132. 3 152. 0 108. 7 56. 0 137. 8	84. 9	35. 3
Ohio         88         92         101         96         96         88         102         144         170         120         75         155           Indiana         81         85         95         105         84         89         85         142         168         110         70         150           Michigan         104         121         84         116         71         63         95         107         120         90         40         125           Wisconsin         104         114         92         112         96         76         93         106         120         85         35         120           Minnesota         96         98         99         109         78         72         80         92         115         60         30         100           Iowa         87         79         82         128         100         70         55         139         170         100         51         140           Missouri         80         80         83         121         79         101         75         144         170         115         60         30         106 <td>110 115 125 85 80 65 130 100 95 95</td> <td>55 55 65 30 30 30 60 70 45 50</td>	110 115 125 85 80 65 130 100 95 95	55 55 65 30 30 30 60 70 45 50
North Central 92.6 97.0 94.2 109.7 82.0 76.2 80.9 111.6 134.0 81.9 42.4 122.7	87. 8	38. 8
Delaware         87         86         119         94         86         50         103         131         140         80         75         160           Maryland <sup>1</sup> 103         94         133         120         113         84         105         122         140         105         50         125           Virginia <sup>1</sup> 121         105         161         156         148         117         120         128         140         130         50         120           West Virginia         97         100         105         120         105         63         80         141         167         125         80         125           North Carolina <sup>1</sup> 94         93         97         113         99         95         108         135         160         150         65         105           South Carolina <sup>1</sup> 65         64         70         66         68         71         68         149         105         115         120           Georgin <sup>1</sup> 65         64         70         66         68         71         68         149         149         150         150         150<	115 95 100 130 120 130 135 185	55 55 55 80 60 70 95
South Atlantic 106.8 101.9 123.9 128.4 120.6 97.5 110.7 139.5 165.7 138.3 67.4 125.0	116. 8	66. 1
Rentucky   1   83   89   90   115   95   63   72   140   155   130   80   130     Tennessee   1   73   77   85   88   81   59   53   142   157   135   90   120     Alabama   74   72   73   76   77   78   94   158   190   150   85   145     Mississippi   71   66   72   79   78   66   81   164   180   165   120   155     Arkansas   69   59   68   79   86   87   88   163   185   150   60   125     Louisiana   59   57   53   67   57   69   82   162   190   165   100   145     Oklaboma   71   73   73   72   75   92   72   156   170   150   75   120     Tenas   63   78   65   64   71   84   73   171   200   165   100   150     Tenas   63   78   65   64   71   84   73   171   200   165   100   150     Tenas   78   78   78   78   78   78   78   7	125 125 145 140 115 135 110 150	70 75 55 50
South Central. 71. 1 72 4 73. 3 81. 5 78. 5 75. 5 75. 1 151. 6 74. 6 151. 4 86. 8 132. 7	130. 5	68. 3
Montana         107         85         140         115         89         98         95         114         120         65         55         170           Idaho         187         183         230         184         188         250         220         94         105         55         45         120           Wyoming         103         110         130         105         92         150         105         110         125         70         65         120           Colorado         145         145         165         155         163         190         95         69         130         55         45         110           New Mexico         56         70         75         70         80         70         77         148         175         120         95         150           Arizona         74         55         80         74         85         85         85         84         200         101         110         110         110         110         110         110         110         110         110         110         110         110         110         120         121         130         92	110 60 75 60 115 125 60 110 75 85	45 30 70 120 40 60 40 50
Western 148.5 152.5 176.6 154.9 157.8 190.7 149.0 103.3 113.8 63.9 52.0 125.7	_	_
United States   109. 3   114. 7   116. 6   122. 8   110. 5   109. 7   111. 8   121. 0   141. 3   95. 1   52. 7   128. 8	89. 0	42, 9

Bureau of Agricultural Economics. Yield figures are estimates of the crop-reporting board, revised, 1919 to 1928. See introductory text. Prices are based upon returns from crop reporters.

<sup>&</sup>lt;sup>1</sup> Prices shown for years 1926–1931 in early and mid-season States marked represent approximate seasonal average.

Table 238.—Potatoes: Acreage, yield per acre, and production in specified countries, average 1925-26 to 1929-30, annual 1930-31 and 1931-32

		Acreage	3	Υi	eld per	acre	I	roduction	n.
Country	A ver- age 1925-26 to 1929-30	1930-31	1931–321	A ver- age 1925- 26 to 1929-30	1930-31	1931-321	A verage 1925–26 to 1929–30	1930-31	1931-32 1
NORTHERN HEMISPHERE	1,000	1,000	1,000	Bush-	Bush-	Bush-	1,000	1,000	1,000
North America: Canada United States	acres 552 3, 297	acres 571 3,038	acres 584	els 135, 1	els 140.8	els 149. 3	bushels 74, 579	bushels 80, 402	bushels 87, 175
Total	8, 849	<u> </u>					·		
Europe:  United Kingdom Irish Free State Norway Sweden Denmark Netherlands Belgum France Spain Italy Switzerland Germany Austria Czechoslovakia Hungary Yugosle via Rumania Poland Lithuania Latvia Estonia Finiah	800 369 129 366 173 438 408 8, 608 8116 6, 945 560 644 6, 125 560 644 6, 125 720 166	684 347 117 336 167 397 402 3, 490 915 6, 930 6, 930 67 406 1, 639 632 6, 602 403 231 175	346 116 327 156 401 402 3, 516 6, 979 479 1, 779 1, 779 1, 779 1, 740 683 6, 715 409 247 247 107 107 107 107 107 107 107 107 107 10	238. 1 263. 3 173. 2 209. 5 280. 0 305. 4 145. 4 172. 0 83. 9 224. 7 201. 7 178. 4 117. 8 158. 7 155. 1 142. 4 158. 1	251. 5 240. 5 196. 8 216. 6 281. 3 270. 8 141. 0 158. 8 83. 2 180. 7 249. 7 209. 2 200. 7 100. 5 90. 2 175. 6 172. 2 175. 6 188. 8	261. 6 157. 3 212. 0 235. 7 252. 7 168. 4 63. 2 249. 2 230. 9 181. 3 177. 7 6. 2	63, 397 36, 243 121, 249 124, 585 2139, 671 72, 837 26, 009 1, 400, 991 83, 216 310, 025 75, 865 972, 152 972, 152 53, 810 28, 477 26, 245	87, 205 28, 144 66, 112 36, 170 111, 691 108, 84S 433, 426 154, 438 71, 794 1, 730, 596 67, 661 67, 661 11, 135, 435 69, 404 40, 568 31, 714	30, 344 51, 440 33, 069 94, 496 101, F80 592, 194 124, 162 28, 164 1, 611, 707 86, 865 316, 062 54, 074 3 87, 302 1, 208, 113 40, 410 28, 899
Russia	13, 476 23, 533	14, 378	14, 838					1, 883, 090	4, 523, 958
Estimated European total, excluding Rus- sia Total Northern Hemi-	28, 200	26, 500	27, 000				4, 533, 000	5, 035, 000	4, 967, 000
sphere countries re- porting area and pro- duction all years Estimated Northern Hemisphere total, ex-	27, 382	27, 429	28, 213	164.3	180. 6	176.8	4, 500, 099	4, 954, 024	4, 987, 376
cluding Russia and China	30, 900	31, 100	31, 800				5, 056, 000	5, 521, 000	5, 550, 000
SOUTHERN HEMISPHERE Chile	93 297 140	111	101	145.8 97.7 95.1			13, 557 29, 031 13, 315	16, 485	
Estimated Southern Hemisphere total	1, 600	2, 200					93, 000	92,000	)
Estimated world total, excluding Russia and China	32, 500	33, 300					5, 149, 000	5, 613, 000	)

Bureau of Agricultural Economics. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere are combined with those of the Southern Hemisphere which immediately follow; thus for 1930-31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931.

<sup>&</sup>lt;sup>1</sup> Preliminary.

<sup>2 4-</sup>year average.
3 Does not include potatoes grown with other crops.

Table 239.—Potatoes, early commercial crop: Acreage, production, and price per bushel, by States, 1928-1931

		Acre	age			Produ	iction		Seaso	nal far bus	m pric hel	e per
Group and State	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
Fall: Texas	Acres 300	Acres 750	Acres 650	Acres 3, 500	1,000 bush.1 18	1,000 bush. <sup>1</sup> 38	1,000 bush. <sup>1</sup> 51	1,000 bush.1 245	Dolls. 1.42	Dolls. 1.05	Dolls 1.80	Dolls. 1.05
Early (sec. 1): Florida	30, 000	22, 000	31,000	26, 900	8, 751	2, 587	2, 489	3, 559	1. 49	1 81	1.86	1. 07
South North	7, 000 23, 000	4, 640 17, 360	4, 800 26, 200	4, 300 22, 600	350 3, 401	348 2, 239	418 2, 071	366 3, 193	2. 10 1. 43	2. 20 1. 75	2. 50 1. 73	1.60 1.01
Hastings La Crosse West	20, 800 1, 850 350	15, 820 1, 190 350	22, 500 3, 200 500	18, 600 3, 000 1, 000	3, 120 228 53	2, 057 159 23	1, 710 320 41	2, 548 495 150	1. 44 1. 41 . 75	1. 75 1. 74 1. 52	1. 75 1. 65 1. 48	1. 04 1. 00 . 52
Tevas, lower Rio Grande valley	10, 520	9, 800	15,000	13, 650	736	980	1, 530	996	1.72	1. 65	1. 75	1.31
Group total	40, 520	31,800	46, 000	40, 550	4, 487	3, 567	4, 019	4, 555	1. 53	1. 76	1.82	1, 12
Early (sec. 2): Alabama. California. Georgia Louisiana. Mississippi. South Carolina. Texas.	17, 700 22, 650 2, 500 21, 800 1, 000 24, 000 13, 5%	7, 500 10, 300 1, 200 15, 000 15, 000 15, 000 8, 960	11,800 11,300 2,200 22,000 900 16,600 15,950	15, 700 2, 500 30, 800 1, 900 17, 700	2, 741 225 1, 526 90 3, 360	900 61 2,130	2, 090 330 1, 650 66 2, 490	2, 590 450 2, 834 205 2, 920	.80 1.00 1.12	1. 22 1. 35 1. 50 1. 45 1. 30	1.35	. 48 . 87 . 65 . 50 . 47 . 67 . 63
Eagle Lake-Sugar- land-Wharton Other counties	9, 550 4, 030	7, 060 1, 900	10, 350 5, 600	12, 400 6, 900	621 274	353 167				1. 38 1. 12	1. 30 1. 21	- 68 - 55
Group total	103, 230	58, 660	80,750	102, 500	10, 341	5, 774	9, 231	12, 803	. 69	1.33	1. 30	. 63
Second early: Arknnsas Maryland North Carolina Oklahoma Tennessee Virginia	6, 030 11, 500 46, 400 17, 000 2, 000 90, 900	12,000 1,500	31,500 11,000 1,700	9,000 33,500 11,750 2,200	1, 863 6, 403 1, 428	1, 440 3, 438 1, 080	1, 290 4, 410 1, 409	1, 170 5, 192 990	.33 .51 .37	1. 20 1. 00 1. 16 1. 16	.85 1.30 1.10	.48 .52 .50
Norfolk district Eastern Shore Other	14, 000 71, 700 5, 200	54,000	65,000	11, 150 61, 100 4, 560	2, 100 13, 049 754	1, 498 9, 612 526	9, 55	8, 371	.41	1 18	. 94	. 53
Group total	173, 830	122, 040	141, 000	139, 760	26, 380	18, 060	19, 63	18, 638	. 44	1. 13	1.00	. 53
Intermediate: Kansas	18, 760	15, 800	15, 300	16, 300	3, 613	1, 96	2, 724	2, 138	. 2	5 1.11	. 71	. 51
Kaw Valley Scott County	18, 160 600	13, 900 1, 900			3, 500	1, 58	2, 574 0 150	1, 938	. 28		. 70	
Kentucky Missouri Nebraska New Jersey	1,900	4, 610 1, 750	5,070 1,650	5,320 1,600	1, 28 28	55 26	1, 039 2 280	718	3 .50	8 1.10 0 1.20	) .80 ) 1.10	63
Group total	67, 400	55, 430	56, 27	60, 42	11, 88	7, 40	0 10, 61	10, 14	. 38	8 1.40	.84	. 59
Total, all States	385, 280	268, 680	324, 670	346, 73	53, 11	34, 83	43, 55	46, 38	. 5'	7 1. 2	1. 19	. 63

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters.

<sup>1</sup> Bushels containing approximately 60 pounds.

Table 240.—Potatoes: International trade, average 1925-1929, annual 1927-1930

					Calend	ar year				
Country		rage -1929	19	)27	19	28	19	29	193	10 1
	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Eτ- ports	Im- ports
PRINCIPAL EXPORTING COUNTRIES  Netherlands Belgium Italy Canada Poland Hungary Spain Argentina Algeria Ozechoslovakia Estonia Irish Free State Russia <sup>1</sup> Japan	7, 761 7, 118 3, 855 2, 778 2, 341 2, 138 1, 475 1, 062 886 865 756 606	1,000 bushels 659 5,090 1,933 688 12 262 213 1,413 951 1 647 8 9 0 0	1,000 bushels 16, 987 6, 951 8, 294 7, 687 5, 103 2, 663 1, 931 2, 966 1, 152 2, 729 1, 310 1, 018 1, 018 1, 018	1,000 bushels 748 3,813 505 504 8 210 949 33 1,381 1,498 6 6 0 0	1,000 bushels 17, 833 14, 027 7, 612 6, 309 2, 925 2, 624 1, 901 1, 396 1, 208 1, 380 1, 351 2, 495 784 187	1,000 bushels 1, 231 4, 197 4, 265 708 8 435 1, 800 42 1, 783 534 1 322	1,000 bushels 21,071 5,642 7,145 3,240 3,602 2,338 1,479 1,147 490 579 1603 312	1,000 bushels 388 8, 182 4, 223 1, 189 8 464 1, 917 482 1, 423 438 0 762	1,000 bushels 20,002 9,726 4,853 7,128 1,478 1,895 2,576 2,616 1,552 347 412 333 1 1752 365	1,000 bushels 373 9,477 1,960 844 4 92 762 559 2 1,898 443 0 535
Total	58, 808	13, 104	60, 714	10, 224	64, 241	15, 326	61, 431	19, 426	54, 636	16, 946
PRINCIPAL IMPORTING COUNTRIES										
Germany United Kingdom France. United States Ouba. Austria. Switzerland Portugal Uruguay Brazil Egypt. Denmark Finland Yugoslavia. Sweden. Tunis. Phillippine Islands. Venezuela. Norway.	865 4 120 1 0 139 67 1 98	16, 623 14, 071 12, 205 4, 224 4, 294 8, 903 2, 596 1, 748 1, 483 1, 182 845 719 624 469 422 411 358 161 62	2, 537 3, 039 9, 347 2, 379 78 194 3 3 46 1 0 101 47 2 2 158 2 0 0 0 87	23, 484 10, 838 9, 821 5, 272 4, 076 2, 484 1, 463 1, 452 1, 314 853 740 327 519 615 436 345 142 52	6, 684 1, 854 12, 653 2, 698 151 3, 001 59 2 0 0 247 38 0 07 1 3 0 0 0 1 5	17, 956 17, 727 14, 422 3, 710 3, 610 2, 066 2, 822 2, 397 1, 023 753 1, 081 753 1, 082 409 382 228 99	5, 450	11, 305 10, 844 15, 538 4, 276 8, 428 2, 401 2, 363 1, 587 1, 488 938 938 32 489 406 273 3	3, 671 2, 066 7, 550 1, 899 83 223 1 1 2 63 3 1 0 0 43 38 0 0 7 1 2 2 2 2 3	11, 755 10, 736 9, 191 5, 060 2, 393 1, 625 3, 336 2, 2, 489 2, 1, 846 1, 093 341 256 840 74 510 340
Total	21, 861	64, 492	18, 103	66, 000	27, 478	73, 273	22, 494	59, 593	15, 729	51, 89

Bureau of Agricultural Economics. Official sources except where otherwise noted. These figures do not include sweetpotatoes.

Table 241.—Potatoes: Estimated average price per bushel received by producers United States, 1922-23 to 1931-32

Crop year	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	Мау 15	June 15	Weight- ed aver- age
1922-23 1923-24 1924-25 1924-25 1925-28 1925-27 1927-28 1923-29 1929-30 1930-31 1931-32	Cents 109. 0 102. 9 109. 0 125. 5 174. 6 183. 1 77. 4 88. 0 129. 4 82. 5	101. 4 120. 8 111. 3 155. 4 140. 5 146. 3 71. 9 139. 1 108. 8	109. 6 81. 0 121. 1 130. 6 107. 4 64. 8 136. 0 109. 9	66. 2 91. 4 68. 8 125. 6 126. 4 97. 9 58. 0 138. 2 101. 4	60. 5 82. 5 63. 5 198. 4 141. 3 95. 4 56. 9 134. 8 95. 0	58. 8 81. 5 64. 1 201. 5 137. 0 94. 1 57. 7 135. 3 89. 8	62. 0 86. 4 70. 2 220. 5 139. 1 93. 6 58. 9 137. 8	64. 2 88. 1 72. 3 226. 0 134. 1 96. 2 59. 5 139. 1	68. 6 87. 8 71. 4 225. 6 127. 0 113. 1 58. 4 136. 3	77. 4 91. 1 70. 5 270. 5 126. 8 116. 8 55. 3 145. 8	91.3 70.6 244.8 146.0 103.3 59.3 149.9	100. 7 84. 4 190. 1 191. 0 83. 6 63. 7 148. 6	94.6 77.9 183.4 142.0 108.1 62.0 136.1

Bureau of Agricultural Economics. Based upon returns from special price reporters. Monthly prices by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by car-lot shipments. Mean of prices reported on 1st of month and 1st of succeeding month, July, 1922–December, 1923. For previous data see 1930 or earlier Yearbooks.

<sup>&</sup>lt;sup>1</sup> Preliminary. <sup>2</sup> International Yearbook of Agricultural Statistics. <sup>2</sup> 3-year average.

TABLE 242—Potatoes: Average price 1 per 100 pounds in car lots to jobbers, Chicago, 1922-23 to 1931-32

Crop season 2	Apr.	Мау	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Мау
1923-24 1924-25 1925-26 1926-27 1927-28 1928-29	3 4.48 3 6.27 8 4.75	Dolls. 3 3.80 4.80 2.88 3.42 6.57 4.48 2.94 4.04 3.57 2.30	Dolls. 3. 11 3. 21 2. 51 2. 96 3. 91 4. 65 1. 74 2. 71 3. 01 1. 56	Dolls. 2.21 2.78 1.80 3.21 2.35 2.30 1.15 2.78 1.82 1.58	Dolls. 1.64 2.18 1.39 2.68 2.22 2.02 1.06 2.43 1.89 1.45	Dolls. 1.18 1.69 1.32 1.99 2.45 1.70 1.04 2.49 2.10 1.05	Dolls. 1.00 1.06 .96 2.66 2.47 1.53 .91 2.40 1.77 .90	Dolls	Dolls 88 1. 06 1. 20 3. 65 2. 23 1. 53 . 92 2. 34 1. 55 1. 02	Dolls 91 1. 40 1. 18 4. 03 2. 28 1. 52 1. 00 2. 57 1. 63	Dolls	Dolls. 1. 17 1. 36 1. 09 4. 01 1. 96 2. 17 . 85 2. 44 1. 59	Dolls. 1. 27 1. 32 . 84 4. 51 2. 11 1. 85 . 71 2. 87 1. 66	Dolls. 1. 02 1. 27 1. 16 3. 09 3. 18 1. 40 . 81 2. 76 1. 29

Bureau of Agricultural Economics. Compiled from daily market reports from bureau representatives in the various markets. Average prices as shown are based on stock of U. S. No. 1 grade; they are simple averages of daily range of selling prices. In some cases conversions were made from larger to smaller units, or vice versa, in order to obtain comparability.

TABLE 243.—Sweetpotatoes: Acreage and production, by States, average 1924-1928, annual 1928-1931

			Acreage				P	roductio	n	
State	Aver- age, 1924- 1928	1928	1929	1930	1981 1	Aver- age, 1924- 1928	1928	1929	1930	1931 1
	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
New Jersey Indiana Illinois Il	67 13 2 6 2 8 4 4 6 8 8 5 4 4 8 6 1 1 5 2 8 6 4 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2012 13 3 5 5 2 8 8 4 6 9 86 62 46 84 20 14 50 64 92 23 62 84 85 62 85 85 85 85 85 85 85 85 85 85 85 85 85	200 12 3 5 2 2 10 4 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	27 2 5 5 3 9 5 5 7 9 9 7 7 7 5 4 9 9 9 1 9 3 6 6 5 5 6 6 7 9 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	2012 4 6 3 3 10 6 8 11 21 21 21 21 21 21 21 21 21 21 21 21	bush. 1, 275 498 192 510 510 1, 348 1, 357 1, 357 1	biash. 1, 345 450 230 230 250 1,710 15,184 6,970 1,720 1,720 4,700 6,4900 2,460 2,460 2,460 2,474 2,460 2,474 2,460 2,474 2,460 2,474 2,460 2,474 2,474	bush. 1, 500 480 1800 480 900 480 1, 629 5, 029 5, 029 7, 9820 1, 274 1, 820 1, 958 1, 3420	bush. 1, 440 400 285 765 525 526 526 6, 750 4, 655 6, 320 4, 520 4, 520 1, 190 1, 190 1, 190	busk. 1, 950 544 300 900 900 2, 75 6, 560 3, 180 4, 75 1, 433 4, 5, 35 5, 344 5, 33 1, 33 1, 43 1, 44 1, 54 1, 44 1, 54 1, 54
California	10	11	8	10	12	957	1, 045	792	1, 100	1, 14
United States	642	638	646	648	778	57, 956	59, 650	64, 963	53, 663	62, 90

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

<sup>&</sup>lt;sup>1</sup>Prices do not include Russet Burbanks.
<sup>2</sup>Crop-movement season extends from April of one year through May of the following year, with irregular quotations continuing through June and July.
<sup>3</sup>Less-than-car lot-sales to lobbers.

<sup>&</sup>lt;sup>1</sup> Preliminary

Table 244.—Sweet potatoes: Acreage, production, and value, United States, 1919-1931

Year	Acre- age	Aver- age yield per acre	Pro- duc- tion	Price per bushel re- ceived by pro- ducers Dec. 1	Farm Value Dec. 1	Year	Acre- age	A ver- age yield per acre	Pro- duc- tion	Price per bushel re- ceived by pro- ducers Dec. 1	Farm value Dec. 1
1919	1,000 acres 792 768 819 819 675 467 567	Bush- els 99. 0 100. 4 90. 3 96. 1 94. 9 80. 8 79. 7	1,000 bushels 78, 422 77, 124 73, 958 78, 665 64, 041 37, 444 45, 201	Cents 133. 6 112. 9 88. 2 76. 6 98. 1	1,000 dollars 104,748 87,072 65,204 60,262 62,831	1925 1928 1927 1928 1929 1930 1931 1	1,000 acres 637 646 724 638 646 648 778	Bush- els 78. 9 98. 3 98. 3 93. 5 100. 6 82. 8 80. 9	1,000 bushels 50,241 63,531 71,156 59,650 64,963 53,663 62,904	Cents 134. 9 93. 8 82. 7 90. 9 93. 9 90. 0 57. 4	1,000 dollars 67,752 59,612 58,856 54,218 60,982 48,323 36,132

Bureau of Agricultural Economics. Acreage, yield, and production figures are estimates of the cropreporting board, revised, 1919 to 1928. See introductory text; italic figures are census returns. Prices are based upon returns from crop reporters.

Table 245.—Sweetpotatoes: Yield per acre and estimated price per bushel December 1, by States, averages, and annual 1926-1931

			Yie	ld per a	acre			Est	imate	d pri	ce per	bush	el Dec	c. 1
State	Av- erage, 1919- 1928	1926	1927	1928	1929	1930	1931	Av- er- age, 1925- 1929	1926	1927	1928	1929	1930	1931
	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.
New Jersey	124	135	110	130		120	150	148	120	120	120	140	120	70
Indiana	118	120	110	115			135		145	135	130	135	135	70
Illinois	90	100	90	90	96	80	106	136	135	115	110	130	115	60
Iowa	91	95	85	115	84 90	95		181	200	150	155	170	180	90 75
Missouri	96	104	101	95	90	85	90	1.28	130 135	120	105	120	110	75
Kansas	122	125	135	135	120	105	95	132	135	110		135	110	75 35
Delaware	135	140	115	145	148	75	175	99	65	70	80	90	90	35
Maryland	146	165	165	190	181	70	183	97	75	70	80	90	90	50
Virginia	130	125	140	144	141	80 90	125	95	100	85	70	90	100	35 55
North Carolina	100	91	114	98	112	90	82	95	100	80	85 85	90	90	55
South Carolina	84	77	97	85	107	95	60	99	100	80	85	85	80 75	65 65 70
Georgia	80 87	86	81	73	93	80 80	50	89	80	75	85	80	75	65
Florida	87	90	85 85	85 80	91	80	78	114	125	85	115	105	95	70
Kentucky	90 103	105	85	80	91	65	100	123	108	120	115	120	120	70
Tennessee	103	122	99	94	102	84	80	97	70	85	95		90	55 65
Alabama	86	95	90	95	98	85	68	95		85	90	90	85	65
Mississippi	91	95	104	100	116	85	85	89	95	80	90 90	.80	75	50 55
Arkansas	98 77	108	116		85	84	90	101	95	80	90	115	95	55
Louisiana	77	. 80	85	75	74	70	75	89	90	85 80 80 75 85 120 85 85 80 80 70	85 95	85 115	90	50 70 60
Oklahoma	97	105	106	89	84 76	70 70	70 72	105 103	100 95	80	100	105	100 95	70
Texas	82	88	85 120	78	76	70	72	103	155	200	200	109	95	00
Arizona	139 106	150 90	120 95	142 95	99	110	95		110	115	110	145	105	80
California	100	90	90	80	99	110	90	190	110	110	710	120	100	
United States	92, 9	98. 3	98. 3	93. 5	100. 6	82. 8	80. 9	99. 3	93.8	82. 7	90. 9	93. 9	90.0	57.4

Bureau of Agricultural Economics. Yield figures are estimates of the crop-reporting board, revised, 1919 to 1928. See introductory text. Prices are based upon returns from crop reporters.

<sup>&</sup>lt;sup>1</sup> Preliminary.

Table 246.—Sweetpotatoes: Car-lot shipments, by State of origin, 1921-22 to 1980-31

	Crop-movement season 1													
State	1921- 22	1922- 23	1923 24	1924- 25	1925- 26	1926- 27	1927- 28	1928- 29	1929- 30	1930- 31 <sup>2</sup>				
New Jersey 3	Cars 2, 196 62 1, 722 1, 286 5, 300 1, 022 135 1, 400 112 85 1, 578 591 181 554 893 147 759 1, 000 332	Cars 2, 857 2, 632 1, 750 6, 633 680 236 781 1123 55 1, 495 240 1, 033 85 974 982 288	Cars 1, 528 1, 549 1, 123 5, 374 563 164 610 4 62 30 726 382 61 263 403 110 535 684 240	Cars 1, 894 103 1, 750 1, 155 5, 213 816 120 1, 103 11, 137 649 86 371 558 107 221 466 247	Cars 1, 357, 236 1, 742 1, 520 4, 750 1, 510 231 673 241 241 250 2, 502 663 156 476 2, 340 216 485 1, 161 419	Cars 1, 770 284 1, 885 2, 283 6, 501 1, 683 162 678 185 709 548 1, 285 268 1, 285 702 1, 186	Cars 1, 225 209 1, 517 2, 256 6, 618 1, 711 276 667 159 159 159 159 1, 147 211 312 1, 147 294 1, 284 805 308	Cars 1, 223 231 1, 470 2, 106 6, 480 130 227 69 139 12, 915 393 126 316 981 2255 717 767 258	Cars 1,090 352 1,454 1,859 7,090 729 375 8 527 8 125 570 271 1,463 1002 728 338	Cars 1, 078 3555 771 975 5, 361 883 284 348 348 348 222 2, 903 219 11, 224 78 77 869 427				
Total 3	19, 385	21, 562	14, 532	16, 067	20, 859	25, 755	23, 423	19, 545	22, 042	17, 324				

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

Preliminary.

Table 247.—Sweet potatoes: Estimated average price per bushel received by producers, United States, 1922-23 to 1931-32

Crop year	July 15	Aug. 15	Sept.	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	Weight- ed aver- age
1922-23 1923-24 1924-25 1925-26 1926-27 1927-28 1928-30 1928-30 1930-31 1931-32	119.5 135.9 125.0	127. 5 151. 3 151. 4 196. 3 189. 0 146. 7 181. 0 136. 2	133.6 157.0 177.4 153.9 121.9 120.9 127.9 128.7	90. 4 114. 8 145. 1 169. 4 110. 6 98. 1 111. 2 112. 5 110. 7	79. 0 101. 0 130. 3 144. 4 88. 5 86. 5 100. 2 97. 7	84, 8 103, 8 140, 1 141, 5 94, 0 91, 9 101, 8 98, 9	92. 5 112. 5 145. 5 149. 3 97. 8 93. 4 104. 2 103. 1 98. 1	96. 9 123. 7 160. 2 162. 4 109. 0	100. 1 129. 0 180. 8 171. 4 112. 3 109. 6 117. 0 114. 6	103. 8 140. 4 196. 2 180. 4 112. 8 115. 1 120. 8 118. 3	107. 9 139. 2 180. 1 192. 2 118. 9 121. 4 125. 9 126. 4	107. 4 138. 9 170. 2 198. 8 136. 0 124. 7 120. 8 128. 6	121. 7 152. 4 165. 9 120. 3 106. 5

Bureau of Agricultural Economics. Based upon returns from special price reporters. Monthly prices by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by average monthly marketings. For previous data see 1930 or earlier Yearbooks.

<sup>&#</sup>x27;Crop movement season extends from July 1 of one year through June of the following year.

<sup>\*</sup>Freuminary.

\*Figures for certain States include shipments in July of succeeding crop year as follows: New Jersey, 1922-23, 3 cars; Indiana, 1928-27, 1 car; Virginia, 1928-29, 1 car; North Carolina, 1226-27, 3 cars, 1927-28, 10 cars; South Carolina, 1922-23, 1 car; Georgia, 1927-28, 2 cars; Kentucky, 1921-22, 1 car, 1926-27, 12 cars, 1928-29, 5 cars, 1930-31, 5 cars; Tennessee, 1921-22, 17 cars, 1924-25, 3 cars, 1925-26, 11 cars, 1926-27, 309 cars, 1927-28, 6 cars, 1928-29, 135 cars, 1929-30, 10 cars, 1930-31, 1 car; Louisiana, 1926-27, 1 car; New Mexico, 1921-22, 5 cars, 1928-20, 1 car, 1930-31, 2 cars; Tennessee, 1928-27, 19 cars in August.

\*Includes 3 cars in June, 1923.
\*\*Uncludes 10 cars in June, 1923.

Includes 10 cars in June, 1929.

Table 248.—Spinach, commercial crop: Acreage, production, and price per bushel or ton, 1928-1931

Utilization		Acr	eage			Produ	etion		Seasonal farm price			
o uniaduon	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
For manufacture	44, 520 14, 640	50, 190 18, 170	46, 530 9, 350	Acres 49, 570 7, 850	11, 251 Tons 1 73, 200	15, 042 Tons 2 96, 900	11, 353 Tons 2	Tons 2 34, 700	0. 60 17. 51	0. 45 16. 76	0. 54 14. 79	0. 40 12. 82

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters and canning establishments.

<sup>2</sup> Short ton.

Table 249.—Strawberries, commercial crop: Acreage, production, and price per quart, by States, 1928-1931

Group and State		Acr	eage			Prod	uction	1	Seaso	nal far cre		e per
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
Early: Alabama	4.500	Acres 6, 820 6, 800 24, 360 1, 080 3, 160	Acres 6, 930 9, 000 24, 600 1, 240 2, 030	3, 850 9, 100 24, 600 1, 400	1,000 crates <sup>2</sup> 495 229 1,392 63 102	518 544 1, 437	298 603 1, 181 51	crates <sup>2</sup> 424 655 1,870 105	3.80 8.40 5.50 4.30	5. 30 5. 00 3. 35	3. 10 6. 70 5. 50 2. 65	2, 90 5, 75 4, 55 2, 75 6, 25
Group total	35, 680	42, 220	43,800	40, 500	2, 281	2, 695	2, 206	3, 190	5. 36	4.42	5. 40	4. 59
Second early: Arkansas California (S. Dist.) Georgia North Carolina South Carolina Tennessee Virginia	7, 500 300 18, 080	1, 280 400 7, 000 500 16, 810	1,800 800 5,400 360 12,600	1,740 250 5,300 320	347 19 818 30 1, 012	266 18 679 84	385 14 437 24 617	353 20 636 27 590	1.90	4. 30 2. 90 3. 10 3. 35 2. 40	3.85 2.60 2.90 2.90 3.10	3.85 2.65 2.65 2.65 2.50
Group total	59, 460	56, 970	43, 660	32, 130	4, 123	3, 877	2, 354	2, 527	2. 53	2.76	8.20	2.77
Intermediate: California, (other) Delaware Illinois Kansas Kentucky Maryland Missouri New Jersey Oklahoma	4, 930 4, 700 960 8, 720 13, 800 26, 490	4, 790 960 6, 240 11, 750 21, 990 4, 000	2, 250 4, 100 4, 070 860 4, 250 9, 400 15, 000 4, 500 1, 400	3, 530 6, 080	364	326 469 283 64 443 905 1, 209 276 76	484 242 183 34 217 498 495 306 38	352 400	3. 60 1. 90 2. 90 3. 35 2. 40 1. 70 2. 60 2. 40 1. 90	2. 60 2. 15 2. 40 2. 60 2. 60 2. 40	2, 90 3, 60 3, 60 4, 30 2, 90 4, 55 3, 80	2.60 3.00 2.40 3.75 2.75 3.00 2.50
Group total	67, 300	58, 740	45, 830	37, 920	4, 210	4, 051	2, 497	2, 234	2. 37	2, 65	3. 66	2. 98
Late: Indians Iowa Michigan New York Ohlo Oregon Pennsylvania Utah Washington Wisconsin	6, 090 4, 480 3, 700 10, 000 3, 190 1, 400 8, 900 2, 840	2, 690 6, 940 4, 300 4, 370 10, 500 2, 870 1, 510 7, 900 2, 840	2,770 7,220 4,390 4,280 9,450 2,900 1,510 7,500 2,840	2,700 7,250 4,600 3,100 9,930 2,670 1,510 7,880 2,900	327 248 780 348 118 703 128	172 361 378 310 693 261 106 529 258	166 455 386 154 567 206 106 338 145	616 492 208 695 248 60 528 200	3. 60 3. 60 4. 10 4. 30 3. 10 3. 35 2. 90 4. 10 5. 00	4. 30 4. 30 4. 10 3. 10 3. 60 3. 35 2. 90 2. 90 3. 60	4. 55 4. 55 4. 55 3. 35 3. 80 2. 90 3. 60 4. 80	2. 90 2. 45 2. 60 2. 85 2. 90 4. 10 2. 90 2. 45
Group total												_
Total all States	207, 280	203, 360	177, 690	15 <b>4, 44</b> 0	13, 904	13, 810	9, 637	11, 286	3. 21	3. 23	4.04	3. 3

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters.

<sup>1</sup> Bushels containing approximately 20 pounds.

<sup>&</sup>lt;sup>1</sup> Includes undetermined quantities used for canning, cold pack, etc.
<sup>2</sup> 24-quart crates containing approximately 36 pounds.

Table 250.—Strawberries: Car-lot shipments, by State of origin, 1927-1931

_		Cal	endar	year				Cal	endar :	year	
Group and State	1927	1928	1929	1930	1931 1	Group and State	1927	1928	1929	1930	1931 1
Early: Als. Fia. La. Miss. Tex. Other States. Second early: Ark. Calif., souther district. N. C. S. C. Tenn. Va. Other States. Intermediate: Calif., other. Del.	Cars 901 618 1,659 65 126 2,049 35 2,202 33 2,425 1,104 20 147 915	2,850 88 148 2,046 18 2,151 71 2,180	1,633 2,859 115 253 1 2,488 10 1,483 30	74 92 6 688 16 756 9 1,158 335	4,720 129 65 3 578 1,228 1,066 527 14 174 111	Intermediate: Ind	Cars 444 411 57 976 1, 515 1, 986 67 114 189 110 93 31 28 17, 893	186 46 35 61 70 99 106 39 20	734 2, 062 176 111 47 79 55 103 61 26 5	48 29 404 424 807 106 39 44 57 31 35	36 23 395 353 692 60 3 21 53 58 37 23 8

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

Table 251.—Tomatoes: United States commercial production, imports and exports, annual, 1923-1931

	Commercia	l production	Imp	orts, year	beginning	July	Exports, ginnin	year be- g July
Year	For market	For manu- facture	Fresh	Canned	Other- wise prepared	Paste	Canned	Catsup and sauces
1923 1924 1925 1926 1926 1927 1928 1929 1930	1,000 pounds 972,300 1,043,300 1,995,800 762,400 976,300 871,000 938,400 946,500 925,600	1,000 pounds 2,330,600 2,380,400 3,618,400 1,997,200 2,391,800 1,989,600 3,025,400 3,491,200 2,029,200	1,000 pounds 1 50, 838 69, 216 82, 448 124, 489 113, 357 128, 826 113, 480	1,600 pounds 30, 946 73, 902 84, 897 80, 257 103, 782 114, 042 147, 429 75, 173	1,000 pounds 1 1, 341 9, 443 (1)	1,000 pounds 1 4,104 17, 382 18,179 15, 642 12, 064 9, 539 16, 547 11, 605	1,000 pounds 9, 152 5, 203 5, 794 7, 504 6, 725 4, 057 2, 916	1,000 pounds 1 3, 560 5, 520 6, 008 7, 556 8, 584 13, 066 10, 419 5, 210

Bureau of Agricultural Economics. Production figures based upon returns from crop reporters and canning establishments; imports and exports compiled from Monthly Summary of Foreign Commerce of the United States, June issues.

Preliminary.
 Figures for Florida include shipments in December of preceding year as follows: 1927, 2 cars; 1929, 1 car;
 1930, 107 cars; 1931, 16 cars.

<sup>&</sup>lt;sup>1</sup> January-June, 1924. <sup>2</sup> From 1926 on included with "tomatoes, canned."

Table 252.—Tomatoes, commercial crop: Acreage, production, and price per bushel or ton, 1928–1931

Utilization, marketing		Acre	age			Produ	ıction		Seas	onal f	arm p	rice
season, and State	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
For market: FallEarly (sec.	Acres 1, 200		Acres 3, 980	Acres 6, 870	1,000 bushels 1 74	1,000 bushels <sup>1</sup> 844	1,000 bushels <sup>1</sup> 264	1,000 bushels <sup>1</sup> 439	Dols. 2.86	Dols. 2. 67	Dols. 2.39	Dols. 2. 23
1) Early (sec.	11, 640	14, 700	11, 800	8, 300	1, 339	1, 323	1, 298	772	3. 54	8.00	3. 60	2.15
2)second	25, 750	29, 400	29, 600	27, 300	2, 456	2, 214	2,079	2, 149	3.16	2,48	3.09	1.30
early	29, 840	26, 790	34, 130	39, 050	3,077	3, 287	2 3, 967	3, 857	1.67	2, 15	1, 26	1.01
Intermedi- ate Late (sec. 1) Late (sec. 2)	33, 660 22, 820 14, 150	25,920	30, 840	31, 670	3, 352	3,987	4,052	4,012	1.1	1.54 1.11 1.95	l 1.16	1.01
Total	139, 060	143, 090	156, 350	160, 810	15, 553	16,758	* 16, 901	a 16, 529	1.88	1.84	1.6	1 10
For manufacture: New York. New Jersey Pennsylva- nia. Ohlo	5, 130 1, 660 4, 810 18, 700 13, 500 82, 000 9, 300 5, 500 10, 220 19, 600 1, 600 24, 700	33, 000 3, 420 10, 950 59, 840 5, 440 1, 990 4, 570 20, 940 12, 100 6, 400 9, 200 2, 030 6, 180 41, 680	43, 000 5, 400 12, 400 79, 000 6, 500 2, 600 6, 400 28, 900 14, 900 15, 500 8, 430 14, 000 28, 000 3, 200	30, 000 4, 300 64, 000 4, 650 2, 000 11, 800 10, 800 10, 700 16, 800 2, 500 6, 200 23, 160	118, 800 13, 000 60, 300 149, 600 17, 400 9, 600 16, 800 22, 300 11, 600 11, 800 11, 800 11, 800 11, 800 11, 800 11, 800 11, 800 11, 800 11, 800 11, 800 11, 800 11, 800 11, 800 11, 800	214, 500 13, 700 52, 600 251, 300 20, 700 60, 700 68, 800 224, 400 23, 000 17, 700 56, 900 241, 700	258, 000 16, 200 67, 000 395, 000 20, 890 14, 000 82, 000 60, 700 47, 600 151, 600 121, 900 133, 600 19, 000 55, 800 329, 200	132, 000 15, 500 61, 800 192, 000 22, 300 23, 600 76, 000 116, 000 23, 500 42, 000 117, 500 127, 400	18. 50 11. 60 12. 90 13. 00 11. 00 12. 60 17. 00 15. 70 13. 20 12. 60 12. 60 11. 00 11. 00 11. 00	15. 00 12. 00 13. 20 13. 00 13. 00 13. 00 14. 90 14. 90 12. 10 11. 00 11. 00	15. 40 12. 00 13. 30 17. 40 17. 40 17. 40 17. 40 17. 40 11. 50 11. 50 11. 51	13. 30 15. 60 13. 10 9. 70 12. 00 12. 30 11. 80 11. 80 10. 30 10. 30 10. 20 10. 20 10. 50
Total	265, 750	317, 820	403, 650	287, 410	984, 800	1, 512, 700	1, 745, 600	1, 014, 600	14. 2	15. 20	15. 0	12. 10
Grand total for mar- ket and manu- facture	404, 810	460, 910	560, 000	448, 220	1, 420, 284	1, 981, 924	*2,218,828	11,477,411	29. 90	27, 17	24. 2	20. 59

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters and canning establishments.

Bushels containing approximately 56 pounds.
 Includes some quantities not harvested on account of market conditions. Price refers to harvested

portion of crop.

3 Short ton.

4 Other States include Connecticut, Kansas, Louisiana, Mississippi, Nebraska, New Mexico, Oklahoma, Oregon, South Carolina, Texas, Washington, West Virginia, and Wisconsin.

Table 253 .- Tomatoes: Car-lot shipments by State of origin, 1920-1931

					c	alenda	r year					
State	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931 1
New York New Jersey. Ohio Indiana. Illinois. Illinois. Illinois. Issouri Maryland. Virginia South Carolina Georgia. Fiorida ** Kentucky. Arkansas Tennessee. Mississippi. Tevas ** Colorado. Utah. Washington. California ** Other States.	Curs 1, 945 2, 798 450 1, 265 19 17 194 188 11 4, 192 468 11 1, 393 1, 393 1, 393 2, 001 576	341 23 370 1,945 2,025 38 100 19 1,819 431	Care 1, 902 1, 930 1, 930 1, 332 229 14 19 242 83 145 23 10, 245 163 477 920 3, 441 1, 883 94 378 2, 349	Cars 1, 261 1, 643 956 1, 185 250 10 10 16 271 44 431 18 9, 760 121 12, 144 1, 184 1, 188 2,	Cars 954 2, 150 1, 952 1, 479 1, 479 195 68 167 421 176 9, 140 548 88 985 3, 778 1, 694 1, 694 1, 777 880 83 2, 789 801	Cars 1, 024 1, 907 1, 286 1, 859 539 118 164 313 379 568 855 7, 188 498 109 1, 393 3, 149 1, 393 3, 1457 86 2, 398 1, 116	Curs 656 2, 006 1, 055 1, 514 422 90 96 259 464 4, 351 2, 374 3, 492 2, 272 272 272 272 275 276 276 277 277 277 277 277 277 277 277	Curs 951 1, 329 1, 125 1, 132 270 586 360 0187 822 9, 737 203 240 24, 849 3, 393 24, 620 701 32, 664	Curs 1, 112 678 925 925 120 120 120 166 613 277 161 73 8, 491 42 2, 759 3, 493 599 113 4, 435 599 113 4, 475 796	Cars 838 694 1,020 1,631 237 533 119 7755 488 348 603 2,817 4,941 703 5,338 55 740 2,15 4,241 703	Cars 511 812 1,007 2,217 316 197 139 554 461 6,495 461 318 2,496 138 3451 7,546 138 342 336 5,485 417	Cars 8(v) 51 1, 373 665 315 
Total 2 8	18, 394	17, 415	26, 717	23, 967	26, 880	28, 251	26, 068	32, 604	30, 300	32, 202	33, 578	21,782

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

Figures include cars in following calendar year as follows: California, 1922, 3 cars in January; 1924, 1 car in January; 1925, 1 car in January; 1929, 1 car in January; 1925, 5 cars in January, and 2 cars in February; 1925, 8 cars in January; 1926, 15 cars in January; 1927, 1 car in January; 1928, 1 car in January; 1928, 2 cars in January; 1928

Table 254.—Tomatoes, canned: Pack 1 in the United States, 1918-1931

State							Season	1						
State	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
New York. New Jersey. Pennsylvania Ohio. Indiana. Missouri Delaware. Maryland. Virginis <sup>3</sup> . Kentucky <sup>2</sup> . Tennessee <sup>2</sup> . Arkansas <sup>4</sup> . Colorado <sup>5</sup> . Utah. California. Other States.	1,000 cases 396 667 2 441 357 96, 649 1, 547 	60 1 884 172 876 439 189 2, 529 953  290 594 8, 052	2 680 142 778 715 553 8, 347 1, 162 218 444 1, 773	116 2 186 71 530 136 176 1, 656 217 	3, 205 891  168 664	412 258 174 717 839 1,216 5,722 963 59 176 270 270 284 2,397	1,000 cases 325 180 133 1,050 871 803 3,825 1,116 186 768 180 417 1,767 406	418 338 179 1,955 1,836 1,272 6,175 1,138 275 382 2,168 1,839 1,853	204 118 120 900 895 228 1, 901 572 223 280 558 183 235 2, 347	254 300 254 107 189 1, 131 605 827 3, 671 1, 059 253 368 678 127 792 2, 257	95 95 124 613 306 825 1,720 406 111 160 613 158 924 1,901	122 153 1, 134 622 851 4, 050 918 107 297 769 195		1, 192 510 340 1, 710 508 161 314 761 227 1, 028
United States	15, 882	10, 810	11, 368	4, 017	11, 538	14, 672	12, 519	19, 770	9, 455	13, 137	8, 539	14, 145		

Bureau of Agricultural Economics. Compiled from National Canners' Association, 1918–1926; Bureau of Cansus, 1927–1929; beginning 1930, Foodstuffs Division, Bureau of Foreign and Domestic Commerce.

Preliminary.

Figures for Florida include cars moved in preceding calendar year as follows: 1920, 14 cars in November, 34 curs in December; 1922, 20 cars in December; 1923, 2 cars in December; 1924, 2 cars in November, 55 cars in December; 1924, 14 cars in November, 55 cars in December; 1924, 7 cars in November, 13 cars in December; 1924, 7 cars in November, 13 cars in December; 1927, 1 car in December; 1928, 28 cars in November, 291 cars in December; 1929, 104 cars in November, 392 cars in December; 1930, 4 cars in November, 47 cars in December; 1931, 130 cars in November, 400 cars in December.

<sup>1</sup> Stated in cases of 24 No. 3 cans.

<sup>\*</sup> Stated in cases of 24 No. 3 cans. 2 Previous to 1923, Pennsylvania, Kentucky, and Tennessee composed one group. 3 Includes West Virginia. 4 Previous to 1923, included in "Other States." 5 Includes Washington.

Table 255.—Walnuts: Production and value, California, 1922-1931

Year	Produc- tion	Seasonal farm price	Farm value	Year	Produc- tion	Seasonal farm price	Farm value
1922	Short tons 27, 000 25, 000 22, 500 36, 000 15, 000	Dollars 360. 00 400. 00 460. 00 440. 00 480. 00	1,000 dolls. 9, 720 10, 000 10, 350 15, 840 7, 200	1927 1928 1929 1930 1931	Short tons 51, 000 25, 000 39, 000 30, 000 28, 000	Dollars 330. 00 420. 00 320. 00 410. 00 2 260. 00	1,000 dolls. 16, 830 10, 500 12, 480 12, 300 7, 280

Bureau of Agricultural Economics.

Table 256.—Watermelons, commercial crop: Acreage, production, and price per 1,000 melons, 1 1928-1931

Marketing season		Acre	ege			Produ	uction				arm p melor	
2	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
Early Second early Late	Acres 44, 840 129, 860 31, 710	132, 280	147, 200	145, 100	36, 755		1,000 melons 216,471 251,170 14,760	1,000 melons 16,759 239,494 19,256	Dol- lars 247 148 149	Dol- lars 230 151 160	Dol- lars 190 88 129	Dol- lars 156 75 91
Total	206, 410	216, 590	235, 490	238, 820	64, 088	70, 056	282, 401	<sup>2</sup> 75, 509	172	173	116	101

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters.

Table 257.—Watermelons: Car-lot shipments, United States, 1921-1931

Crop	-mover	nent s	casor	1 1	
		7		<del>-</del> 7	_

season beginning April—	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Total
1921 1922 1923 1924 1924 1925 1926 1927 1929 1929	Cars 7 8 3 2 2 4 4 36	Cars 1, 133 3, 560 702 65 605 443 1, 713 508 3, 498 386 121	Cars 11, 061 15, 291 6, 176 6, 602 11, 767 11, 424 15, 255 10, 410 22, 047 17, 830 16, 161	Cars 19, 229 18, 003 15, 351 26, 024 17, 814 29, 873 20, 898 24, 937 18, 287 29, 028 23, 610	Cars 12, 256 9, 061 8, 583 10, 470 11, 524 11, 497 6, 262 11, 408 7, 582 10, 306 10, 362	Curs 1, 983 1, 616 2, 045 2, 458 2, 390 1, 861 1, 281 1, 183 1, 107 1, 359 1, 610	Cars 80 80 159 120 82 28 67 50 57 102	2 4 2 1	Cars 45, 749 47, 625 33, 081 45, 745 44, 184 55, 128 45, 460 48, 497 52, 514 59, 011 51, 920

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

Table 258 .- Watermelons, Tom Watson: Price per car to jobbers, Chicago and New York, 1924-1931 1

Market and season 1	June	July	August	Market and season !	June	July	August
Chicago: 1924. 1925. 1926. 1928. 1928. 1929. 1930.	Dollars 576 576 623 471 445 365 511 426	Dollars 249 362 281 289 301 339 271 273	Dollars 291 4 211 4 202 252	New York: 1924. 1925. 1928. 1929. 1929. 1929. 1930. 1931.	Dollars 474 \$ 512 400 435 378 368 469 \$ 427	Dollars \$ 270 \$ 311 248 289 262 278 214	Dollars 8 273 202 180 237 216 4 234 211
				li .		4	and the second

Bureau of Agricultural Economics. Compiled from daily market reports from bureau representatives in the various markets. Average prices as shown are based on stock of good merchantable quality and condition; they are simply averages of daily range of selling prices.

<sup>&</sup>lt;sup>1</sup> Preliminary.

<sup>2</sup> Seasonal average price to Dec. 1.

<sup>1</sup> Approximately 1,000 melons per car.
2 Includes some quantities not harvested on account of market conditions. Price refers to harvested portion of crop.

Crop-movement season extends from Apr. 1 through November of a given year.
 Preliminary.
 Reported as shipped in January.

<sup>1</sup> Quotations are for southeastern, 22 to 26 pound average.
2 Commodity reports were issued for season as follows: 1924, June 6-Aug. 30; 1925, May 28-Sept. 5; 1926, May 28-Sept. 1; 1927, May 16-Aug. 20; 1928, May 21-Aug. 24; 1929, May 9-Aug. 31; 1930, May 28-Aug. 16, 1931, June 8-Sept. 1.
3 Auction sales.
4 Thurmond Gray.
5 Less than 10 quotations.

Table 259.—Fruits and vegetables: Unloads of 18 commodities at 12 markets, in car lots, 1930 and 1931 and total 1924–1931

Commodity and calendar year	New York	Chi- cago	Phil- adel- phia	Boston	De- troit	Pitts- burgh	St. Louis	Los An- geles	Cleve- land	Balti- more	Cin- cinnati	San Fran- cisco
Apples: 1930	Cars 10, 685 11, 470	Cars 5, 891 6, 193	Cars 2, 419 2, 849	Cars 1, 252 1, 769	Cars 2, 038 2, 242	Cars 2, 800 2, 060	Cars 1, 087 554	Cars 4, 011 3, 650	Cars 1,384 1,101	Cars 569 351	Cars 1,375 952	Cars 875 682
Cabbage: 1930 1931	6, 024 5, 757	1, 866 1, 963	2, 450 2, 928	1, 221 1, 398	814 899	1, 443 1, 217	1, 290 1, 409	14 181	660 584	1, 573 1, 468	769 665	3 3
Cantaloupes: 1 1930 1931	9, 209 9, 184	3, 214 2, 942	2, 415 2, 332	2, 010 1, 972	1, 140 1, 141	1, 411 1, 547	872 802	510 380	1, 096 1, 078	600 627	707 647	589 500
Celery: 1930 1981	4,654 4,177	1, 892 1, 560	1, 802 1, 639	947 819	830 824	991 882	674 565	79 86	442 403	769 714	394 385	432 344
Grapefruit: 1930 1931	6, 150 7, 847	1, 868 2, 143	1,310 1,624	1,088 1,535	643 1, 087	597 728	509 638	120 159	572 796	546 602	373 512	352 393
Grapes: 1930 1931	16, 694 11, 637	4, 834 3, 213	3, 740 2, 647	4, 428 3, 244	1, 445 899	2, 867 1, 722	795 541	90 56	1, 053 519	651 461	584 417	2, 823 2, 080
Lemons: 1930 1931	4, 296 3, 091	1, 119 1, 241	840 838	579 646	454 515	414 504	467 495	1	385 405	451 510	401 431	367 343
Lettuce: 1930 1931	9,849 8,771	4, 853 4, 341	3, 357 3, 162	2, 066 1, 942	1, 702 1, 562	1, 481 1, 259	1, 627 1, 344	1, 212 835	1, 118 1, 127	1, 015 849	712 652	318 294
Onions: 1930 1931	7, 285 6, 764	2, 283 1, 897	2, 408 2, 161	2, 145 1, 877	1, 453 850	1, 141 934	924 853	606 862	878 631	702 609	549 450	671 901
Oranges: 1930 1931	13, 220 19, 040	4, 932 6, 323	4, 130 5, 546	3, 959 5, 651	2, 032 2, 851	1,945 2,836	1, 219 1, 701	203 99	1, 665 2, 191	1,372 1,802	971 <b>1, 454</b>	1, 064 1, 167
Peaches: 1930 1931	3, 872 5, 530	1, 593 2, 901	992 1, 220	807 1, 474	747 1, 632	735 950	509 455	657 669	538 878	383 312	678 837	560 444
Pears: 1980 1981	6, 119 5, 557	2, 138 1, 364	1,520 928	880 707	607 371	876 433	299 149	886 491	456 299	427 242	256 127	455 456
Plums and prunes, fresh: 1930 1931	1,772 1,674	626 435	376 303		229 145		185 54	54 42	186 115	115 60		49 19
Potatoes: 1930 1931	23, 117 20, 368	16, 298 16, 408	8, 871 7, 537	8, 589 7, 898	8, 047 6, 573	4, 610 3, 999	4,851 4,647	6, 509 6, 429	3, 921 3, 900	3, 150 3, 057	3, 439 3, 178	3, 613 3, 651
1930 1931	1, 365 1, 869	1, 151 1, 371	380 439		511 677	303 389	146 289	75 89		142 182		23 9
Sweetpotatoes: 1930	1, 570 1, 121	1, 636 1, 639	320 288		702 779		279 164	305 205	562 660			163 36
Tomatoes: 1930 1931	8, 153 6, 674	2, 965 2, 585	2, 225 1, 860		1,354 1,146	1, 575 1, 332	583 689	566 417	349 265		504 450	648 330
Watermelons: 1930 1931	3, 652 3, 632	2, 828 2, 806	2, 035 1, 643	724 692	1, 539 1, 354	1, 112 852	1,568 1,728	2, 141 1, 966	1, 070 1, 079	985 1, 397		382 406
Total: 1 1924 1925 1928 1927	122, 744 125, 609 128, 667 139, 463	57, 782 59, 349 64, 617	35, 229 35, 383 35, 970	30, 119	13, 589 17, 980 20, 553 22, 679	20, 416	16, 181 16, 278	15, 164 16, 244	16, 082 15, 541 16, 380 16, 825	11 077	11 728	14. 121
1928	140, 142	65,405 64,141 61,982	34, 905 38, 180 41, 590	38, 773 37, 582 34, 360	22, 679 23, 879 27, 918 26, 287 25, 547	25, 450	15, 599 17, 452 17, 884 17, 077	17, 135 17, 817 18, 039 16, 616	17, 913 16, 651	12,397 13,309 15,350	) 14.120	1 12, 965
		<u> </u>	<u> </u>		<u> </u>				<u> </u>	<u> </u>		<u> </u>

Bureau of Agricultural Economics. Compiled from daily reports made by common carriers to bureau representatives in the various markets. Unloads as shown in car lots include those by boat and less than car lots reduced to car-lot basis. This table not comparable with table published in former Yearbooks.

<sup>&</sup>lt;sup>1</sup> Includes honeydews and other miscellaneous melons. <sup>3</sup> Totals include: 1924–1926, 16 commodities, beginning 1927,18 commodities.

Table 260.—Fruits and vegetables: Unloads of truck receipts of specified commodities in 7 markets, in car-lot equivalents, 1930 and 1931

Commodity and year	Boston	Denver	Los Angelos	New York	Phila- delphia	Salt Lake City	San Fran- cisco
Apples: 1930 1931	Cars 1, 616 1, 568	Cars 30 17	Cars 199 266	Cars 2, 793 2, 300	Care 1,397 1,853	Cars 127 124	Cars 59 373
Beans, snap: 1930 1931	672	64 45	1, 275	2, 004 1, 675	913 1,036	44 50	15 253
Cabhage: 1930	530 509	98 97	1, 193 1, 099	1, 927 1, 771	593 691	76 76	27 322
Cantaloupes: 1 1930 1931 Carrots:	0 2	116 178	2, 163 2, 331	403 829	794 1, 178	146 204	142 496
1930	697	163 59	2, 126	1, 092 965	310 474	127 136	30 352
1930	37 <u>4</u> 388	187 160	2, 764 2, 469	2, 553 742	195 265	100 94	143 399
1930	687	187 190	1, 014	2, 870 2, 901	1, 554 2, 020	80 74	184 341
1930 1931	364	64 53	424	555 775	243 404	40 81	72
Grapes: 1930	18 35	0	2, 079 1, 455	207 205	125 242	15 26	83 325
1930	1, 057 1, 054	199 206	3, 000 3, 415	2, 241 1, 214	140 434	117 110	188 1, 301
1930 1931 Peaches:	69 83	125 62	669 565	1, 748 1, 519	135 212	80 85	40
1930 1931 Pears:	89	0	1, 145 1, 446	660 1, 833	608 1, 824	74 126	354
1930	51 50	0	420 504	334 222	41 45	43 18	133
Peppers:	237	66 52	415	1, 187 1, 152	464 541	31 32	20 130
1930	0	6 0	284 267	4 5	0 2	22 24	7
1930 1931 Spinach:	136 99	892 499	1, 594 1, 870	3, 286 4, 579	1, 788 3, 571	515 574	26
1930	993 990	77 62	1, 146 1, 143	2, 042 1, 726	436 1, 005	67 54	434
1930	173 160	43 46	823 628	676 609	0 1, 083	62 68	30° 28°
1930	0	0	450 625	1, 148 1, 647	860 1,899	0	3: 14
1930 1931 Watermolons:	581 376	153 109	2, 710 2, 755	2, 266 1, 917	1, 702 1, 474	153 225	25 66
1930 1931	0	35 17	616 763	20 20	118 328	45 66	2

Bureau of Agricultural Economics. Compiled from reports made by bureau representatives in the various markets. Data for some markets are incomplete. They are reported as follows: Demer.— Receipts for 1930 are estimated about 90 per cent of the total truck receipts of these commodities. Philadelphia.—For 1930, truck reports are available for July-December only. They are estimated to represent about 90 per cent of the truck receipts during those months. San Francisco.—For 1930, reports on cantaloupes, corn, strawberries and tomatoes were secured throughout the year; other commodities mostly for November and December only.

<sup>&</sup>lt;sup>1</sup> Includes Casabas, Honeydews, Honey Balls, etc. <sup>2</sup> Includes Romaine.

# STATISTICS OF MISCELLANEOUS CROPS

Table 261.—Beans, dry edible: Acreage, production, value, exports, etc., United States, 1899, 1909, 1914-1931

Year	Acreage	Average yield per acre	Produc- tion	Price per hushel received by pro- ducers Dec 12	Farm value	Whole- sale price at Chicago	Imports, year be- ginning July 1	Domestic exports, year beginning July 1 48
1000		Bushels of 60 pounds 11.9	1,000 bushels 5,064	Dollars	1,000 dollars	Dollars 1, 23	1,660 bushels	1,000 bushels
1999 1909 1914 1915 1910	875 928 1, 107	14.0 13.2 11.1 9.7 8.8	11, 251 11, 585 10, 321 10, 715 16, 045	2. 26 2. 59 5. 10 6. 50	26, 213 26, 771 54, 686 104, 350	2. 27 1. 33 1. 91 2. 54 5. 45	1, 015 906 603 3, 748 4, 146	1 517
1917 1918 1919 1919	1,744	10. 0 12. 1 12. 6	17, 397 14, 029 13, 399	5, 28 4, 26	91, 863 57, 046	6. 89 4. 75	4, 016 3, 806	1, 517 4, 489 1, 993
1920 1921 1922 1923 1924	852 752 1, 0% 1, 344	10.8 11.7 11.9 12.1	9, 225 9, 185 12, 877 16, 308	2. 96 2. 67 3. 74 3. 67	27, 282 24, 515 48, 133 59, 782	4. 06 2. 77 4. 48 4. 22	824 520 2, 623 886	1, 216 1, 100 692 675
1924 1925 1926 1927 1928 1929 1930	1, 576 1, 606 1, 677 1, 571 1, 641 1, 836	9.6 12.4 10.6 10.3 10.8 11.2 11.0	15, 164 19, 029 17, 707 16, 151 17, 647 20, 511 23, 063 21, 298	3.74 3.29 2.93 2.88 4.18 6.27 8.3.90 8.2.46	56, 744 65, 376 51, 876 46, 612 73, 782 76, 765 53, 719 31, 199	3. 28 3. 70 2. 97 7 3. 81 5. 40 5. 86 3. 98 2. 72	1, 421 1, 271 1, 051 2, 465 1, 505 2, 531 1, 346	519 576 529 427 316 296 271

Is a equ of Agricultural Economics. Italic figures are census returns; census figures include all States; other figures, estimates of crop-reporting board, principal producing States only.

Table 262.—Beans, dry edible: 1 Acreage, production, and December 1 price, by States, 1928-1931

						~	vacou	,		-						
State		Acr	eage		Ave	erage ac	yield re	per		Produ	uction				receive	
	1928	1929	1930	1931 2	1928	1929	1930	1931	1928	1929	1930	1931 2	1928 1	1929	1930	1931
Me	ácres 6 5 80 538 6 6 40 86 24 309 214 6	acres 8 3 103 575 8 5 9 22 47 134 31 31 67 7 839	ácres 9 3 124 690 9 6 10 13 49 168 37 432 169 8	4 120 614 7 7 7 14 9 37 178 36 320 161 8	14. 0 14. 5 11. 0 9. 0 9. 7 6. 0 14. 5 19. 0 4. 5 4. 0 7. 0	12. 0 9. 5 12. 0 9. 1 7. 0 6. 0 7. 5 5. 0 16. 0 9. 9 8. 0 4. 1 17. 0	12. 5 10. 0 9. 3 6. 1 6. 7 6. 0 9. 5 12. 0 19. 0 20. 0 4. 5 8. 5 12. 0 19. 9	10, 00 18, 00 9, 00 4, 0 6, 5 5, 5 18, 00 19, 5 17, 0 4, 3 7, 5 7, 0 12, 0 17, 7	90 70 1, 160 5, 918 54 45 87 36 1, 634 360 1, 390 856	5, 232 56 80 68 110 752 2, 680 496 2, 232 1, 653 48 29 5, 768	30 1, 153 4, 209 60 36 95 156 8, 192 7, 40 4, 320 63 12 7, 238	40 2, 160 5, 526 46 91 592 3, 471 612 1, 376 1, 208 12 5, 905	5. 10 5. 15 4. 70 4. 45 3. 90 4. 00 3. 50 3. 40 3. 40 3. 40 3. 40 4. 40	7. 10 7. 45 6. 20 6. 00 7. 20 6. 20 6. 15 6. 20 4. 55 5. 15 4. 50 8. 30 8. 25	7. 30 5. 50 5. 55 4. 30 5. 95 5. 95 5. 20 4. 10 2. 25 2. 55 8. 75	4 70 4.50 3 00 2.10 3.25 2.80 2.90 1.60 1.45 1.75 1.80 2.10 2.85 4.00 3.50

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> Table includes, besides the ordinary edible beans and limas, the blackeye of California which is identical with the blackeyed pea of the South. Soybeans not included.

2 Farm prices are as of Nov. 15, 1914-1924.

3 Prices 1899 and 1999 from Chicago Board of Trade annual reports, quotations for navy, good to choice; 1914-1929 from Dally Trade Bulletin, pea beans (quoted per 100 pounds; converted to bushels of 60 pounds).

4 Imports and exports compiled from Commerce and Navigation of the United States, 1910-1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June issues, 1913; and official records of the Buneau of Foreign and Domestic Commerce.

4 Not separately reported prior to 1918.

5 Dollars per bag of 100 pounds.

9 Preliminary.

Table includes, besides the ordinary edible beans and limas, the blackeye of California which is identical with the blackeyed pea of the South. Soybeans not included.
 Preiminary.
 Price per bushel of 00 pounds.

Table 263.—Beans, dry edible: Production by varieties, 100-pound bags, United States, 1927-1931

Year	Small white and pea beans	Large white	Great North- ern	Yel- low eye	White kid- ney	Red kid- ney	Cran- berry	Red Mexi- can	Pinto	Pinks	Limas 2	Other	Total 3
1927 4 1928 4 1929 1930 1931 5	3, 721 3, 309	1,000 bags 219 236 210 224 338	1,000 bags 1,349 1,229 1,744 2,066 2,006	1,000 bags 117 114 104 77 140	1,000 bags 54 33 42 38 117	1,000 bags 488 680 418 334 586	1,000 bags 113 106 107 123 127	1,000 bags 191 297 305 541 518	1,000 bags 1,530 1,372 2,305 3,024 1,499	1,000 bags 586 589 644 666 567	1,000 bags 1,361 1,855 1,473 1,798 1,727	1,000 bags 345 419 562 672 470	1,000 bags 9,703 10,588 12,240 13,759 12,705

Bureau of Agricultural Economics. Based upon reports by growers on proportion of total production made up of each variety, supplemented by investigations of field statisticians.

TABLE 264.—Beans, dry edible: Production in specified countries, bags of 100 pounds, 1925-26 to 1931-32

Country	1925-26	1926–27	1927-28	1928-29	1929-30	1930-31	1931-32 \$
Canada United States Mexico England and Wales Scotland Netherlands France Italy Spain Germany Czechoslovakia Austria Hungary Yugoslavia Rumania Bulgaria Greece Japan Gloson Brazil Chile Madagascar 4	900 11, 902 4, 326 3, 307 67 403 3, 486 3, 148 3, 728 312 221 1, 086 2, 016 5, 402 1, 303 174	1,000 bags 696 10, 512 4,711 3,540 635 361 2,100 3,534 2,760 311 172 1,358 2,612 5,542 902 205 1,339 11,729 1,1729	1,000 bags 622 9,640 4,307 3,655 67 233 2,707 2,441 1,573 3,877 400 205 215 1,054 1,573 3,784 006 1,637 1,637 1,345 1,251 281	1,000 bags 702 10, 524 3, 883 2, 923 6, 230 1, 536 1, 785 2, 578 253 216 208 605 607 2, 652 2, 652 104 1, 499 83 15, 321 1, 660	1,000 bags 955 12,240 2,094 2,462 60 336 2,249 3,468 3,438 272 247 272 1,023 2,068 5,711 1,121 1,121 1,123 1,123 1,124 1,	1,000 bags 863 13,759 1,774 3,118 76 2,581 3,490 3,631 255 4,470 1,017 1,3352 4,470 1,724 4,720 1,138 1,148	1,000 bags 761 12,705 2,691 2,592 2,277 240 8 1,500 8 2,200 4 1,494
Total countries reporting all periods	34, 789	32, 566	28, 032	23, 572	33, 773	37, 539	34, 094
Total all countries			52, 811	48, 174			J

Bureau of Agricultural Reconomics. Official sources and International Institute of Agriculture except as otherwise stated. Figures are for the harvesting seasons 1925 to 1931 in the Northern Hemisphere and 1925-26 to 1931-32 in the Southern Hemisphere.

Ilma beans.

¹ Table includes, besides the ordinary edible beans and Limas, the blackeye of California, which is identical with the blackeyed ''pea'' of the South. Soybeans not included.
¹ Figures for all Limas include the following: Standard Limas, 1927, 1,036,000 bags; 1928, 954,000 bags; 1929, 987,000 bags; 1930, 1,102,000 bags; 1931, 1,064,000 bags; Baby Limas, 1927, 325,000 bags; 1928, 401,000 bags; 1929, 486,000 bags; 1930, 696,000 bags; 1931, 663,000 bags; Baby Limas, 1927, 325,000 bags; 1928, 401,000 bags; ¹ Totals include blackeyes as follows: 1927, 310,000 bags; 1928, 428,000 bags; 1929, 515,000 bags; 1930, 887,000 bags; 1931, 462,000 bags.
¹ Totals included from bushels of 60 pounds.
² Preliminary.

<sup>&</sup>lt;sup>1</sup> Excluding soy, mung, adzuki, broad, and horse beans and similar classes not commonly used as edible beans in the United States.

Preliminary.
Unofficial estimate.

Production in Hokkaido Province, where most of the dry edible bean varieties are grown.

Table 265 .- Beans, dry, edible: Car-lot shipments, by State of origin, 1920-21 to 1930-31

_				Cro	p-move	ment se	ason 1				
State	1920-21	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27	1927–28	1928-20	19 <b>29-3</b> 0	1930-31 2
New York Michigan Montana Idaho Wyoming Colorado New Mexico California Other States	Cars 935 5,095 29 139 333 740 3,148 80	Cars 1, 555 4, 784 12 141 1 486 839 3, 403 83	Cars 1,650 5,477 44 351 427 75 3,774 46	Cars 1, 969 8, 833 104 749 9 1, 732 146 2, 951 100	Cars 1, 900 7, 848 124 1, 336 31 1, 816 388 1, 847 134	Cars 1, 158 10, 506 288 1, 898 82 2, 927 170 2, 558 138	Cars 916 8, 699 280 1, 437 130 1, 866 412 8, 433 114	Cars 614 4, 989 386 2, 074 252 1, 711 608 3, 251 55	Cars 889 6, 383 566 1, 973 347 1, 732 555 2, 961 122	C'ars 1, 056 5, 616 733 2, 516 577 2, 347 1, 750 3, 588 239	Cars 961 5, 046 647 2, 671 785 4, 312 2, 850 857
Total	10, 499	11, 304	11,844	16, 093	14, 924	19, 725	17, 287	13, 940	15, 528	18, 422	18, 253

Bureau of Agricultural Economics. Compiled from monthly reports received by the bureau from local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

1931-82\_\_\_\_\_

6.08

Table 266 .- Beans, dry, edible: Wholesale price per 100 pounds. 1922-23 to 1931-32 PEA (NEW YORK AND MICHIGAN HAND PICKED), BOSTON 1

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aug.	Aver- age
1922-28 1923-24 1924-25 1925-26 1925-26 1926-27 1927-28 1928-29 1929-30 1930-31 1931-32	Dolls. 7. 06 7. 40 8. 04 5. 50 5. 28 6. 34 9. 94 10. 56 8. 25 4. 62	Dolls. 6. 97 7. 75 8. 18 5. 49 5. 98 6. 18 9. 75 10. 12 4. 25	Dolls. 7. 68 7. 79 8. 10 5. 88 6. 32 6. 12 9. 55 8. 66 6. 38 4. 19	Dolls. 7. 81 7. 12 8. 00 5. 90 6. 11 6. 16 9. 50 8. 09 6. 32 3. 62	Dolls. 7. 62 7. 06 6. 94 5. 67 5. 86 6. 69 9. 95 8. 12 6. 19	Dolls. 7. 71 7. 40 7. 20 5. 49 5. 66 7. 88 10. 97 8. 00 5. 75	Dolls. 7. 66 7. 30 6. 91 5. 32 5. 38 8. 71 11. 13 7. 62 5. 66	Dolls. 7.60 7.28 6.60 5.06 5.28 9.81 10.41 7.12 5.55	7. 27 7. 12 6. 31 5. 01 5. 46	Dolls. 7.35 7.12 6.34 5.48 6.29 10.18 10.38 7.31 5.06	7. 18 7. 16 6. 17 5. 65 6. 48 10. 30	Dolls. 6.89 7.68 5.89 5.48 6.62 10.22 10.32 7.81 4.91	Dolls. 7, 40 7, 35 7, 06 5, 49 5, 89 8, 22 10, 19 8, 14 5, 95

### SMALL WHITE, SAN FRANCISCO 2 5. 40 6. 75 7. 86 7. 32 5. 66 7. 75 7. 15 6. 05 7. 29 7. 42 5. 95 8. 58 8. 36 6. 57 6. 33 7. 54 6. 04 6. 81 6. 29 7. 31 5. 57 8. 26 9. 03 9. 45 7. 64 4. 02 6. 42 7. 04 7. 42 5. 83 8. 57 8. 75 10. 59 7. 43 3. 67 1922-23 5. 59 6. 05 8. 00 6. 20 5. 89 5. 60 8. 11 8. 67 6. 09 2. 98 6. 11 6. 48 5. 92 7. 18 5. 98 5. 81 5. 80 8. 52 8. 06 4. 86 3. 12 7.48 5.92 7.22 6.26 5.83 6.21 9.23 7.38 4.56 7. 23 6. 18 7. 71 6. 25 5. 85 6. 66 9. 99 7. 83 4. 51 7. 27 6. 03 7. 54 5. 97 5. 86 8. 42 9. 90 8. 12 4. 28 7. 22 6. 02 7. 49 5. 87 6. 34 9. 59 7. 87 4. 24 6. 76 6. 04 7. 38 5. 62 7. 17 9. 28 9. 45 7. 83 4. 27 6.09 1923-24 1924-25 1925-26 5. 71 5. 94 5. 88 8. 40 8. 55 5. 20 3. 38 1926-27 1926-27 1927-28 6.65 1928-29----1929-30----1930-31---6. 99 8. 73 7. 02 3. 56 4.70 1931-32\_\_ LIMA, CALIFORNIA, NEW YORK 1 9.39 10.81 14.41 11.83 7.14 7.00 12.61 12.28 9. 59 12. 40 14. 79 11. 20 6. 97 8. 33 13. 50 12. 71 9. 41 12. 68 14. 85 10. 13 6. 97 9. 06 13. 50 12. 71 7. 50 8.59 12.48 14.94 9.15 6.86 9.69 14.40 12.67 9. 79 11. 30 15. 00 12. 06 6. 94 7. 87 13. 42 8. 65 10. 41 14. 12 13. 24 7. 68 6. 85 10. 56 13. 27 8. 74 5. 88 8. 49 9. 84 14. 42 14. 11 8. 44 6. 97 9. 76 14. 39 9. 90 5. 78 8. 80 12. 59 15. 27 8. 88 6. 74 9. 75 15. 25 12. 45 6. 55 8. 91 9. 40 13. 62 15. 92 8. 94 6. 96 9. 90 16. 76 12. 05 8.91 10.09 13.89 11.88 7.01 6.83 12.01 12.95 7.37 8. 25 12. 62 15. 79 8. 76 6. 68 9. 90 15. 90 12. 01 5. 98 8. 55 13. 04 16. 27 8. 55 6. 67 10. 17 16. 17 11. 95 6. 29 8.94 8.94 11,47 14.78 11.31 7.25 8.28 13.08 1923-24. 1924-25. 1925-26. 1926-27. 1927-28 1928-29----1929-30----12, 07 13.02 7.90 1930-31

Bureau of Agricultural Economics. Compiled from the Boston Produce Market Report, weekly; San Francisco Commercial News, daily; and New York Producers Price Current, daily. See 1930 Yearbook, pp. 794-795 for data for earlier years.

7.58 7.94

5, 50

7. 56

<sup>&</sup>lt;sup>1</sup> Crop-movement season extends from September of one year through August of the following year.
<sup>2</sup> Preliminary.

<sup>&</sup>lt;sup>1</sup> Prices represent prevailing values of the commodity and grade specified, as indicated by sales from receivers to wholesale distributors. 2 Quotations for shipment f. o. b. rail California.

Table 267 .- Soybeans: Acreage, production, and value, by States, 1930 and 1931

		]	Beans	gathe	ered			T	otal, e	except	hay			price	Val	ue of
State	Acre	age 1	Yi per	eld acre	Total	yiold		otal age 2		eld	Tota due	l pro-	be	. 1 of ans iered	duc	tion ept
	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	1030	1931
Ohio Ind Ind Mich Wis Iowa Mo Kans Del Md Va N C S C G A K Y Tenn Ala Miss Ark L A L A L A Ind	1,000 acress 21 129 330 22 522 78 8 26 5 18 11 6 6 8 21 7 6 6 5 21 7	2 34 90 12	14. 0 17. 0 10. 5 16. 5 7. 5 6. 5 7. 0 10. 0 10. 0 10. 0 10. 5	17.8 17.5 12.0 10.0 17.0 12.0 9.0	1, 806 5, 712 20 23 858 741 60 156 32 135 7 1, 261 84 110 60 144 84 60 52 220	6, 055 24 20 578 1, 080 108 364 94	21 129 336 2 2 52 78 26 26 3 237 287 284 14 26 18	28 172 346 2 2 34 90 12 26 7 283 253 34 18 28 22 18 12 12	14.0 17.0 10.5 16.5 7.5 6.5 7.5 10.0 10.0 10.0 12.0	17. 8 17. 5 12. 0 10. 0 17. 0 14. 0 14. 0 14. 0 14. 0 15. 5 13. 5 15. 0	1, 806 5, 712 20 23 858 741 60 156 21 3, 081 294 140 156 115 115 115 115 115 115 115 115 115	3, 062 6, 055 24 20 578 1, 080 108 364 94 392 36 8, 542 323 171 185 207 390 174 1, 092	1. 60 1. 20 1. 20 2. 50 1. 65 1. 65 2. 25 2. 40 2. 90 1. 55 2. 20 2. 10 2. 20 2. 20 20 20 20 20 20 20 20 20 20 20 20 20 2	p. bu. 0. 35 35 35 90 60 60 80 2. 15 70 1. 20 1. 20 1. 40 85 95 1. 45 1. 40	2, 167 6, 854 40 1, 158 1, 1223 96 382 7468 611 4, 776 603 420 328 276 252 3, 232	6 18 347 648 108 218 85 314 77
ช. ล	864	956	13. 9	15. 6	11, 975	14, 917	1, 162	1, 271	13.3	14.9	15, 416	18, 885	1.56	. 63	23, 998	11, 919

Bureau of Agricultural Economies. Estimates of the crop-reporting board.

Table 268.—Soybeans: Production in specified countries, 1920-21 to 1931-32

Crop year	United States	Man- churia i	Chosen	Japan	Dutch East Indies
1921-22 1922-23 1923-24 1924-25 1925-26 1926-27 1927-28 1928-29 1929-30 1930-31 1931-32	1,000 bushels 2,815 24,320 26,541 25,680 25,102 26,517 27,469 8,683 8,670 11,975 14,917	1,000 bushels 65,000 109,067 88,867 92,667 116,687 135,000 163,319 177,804 178,389 193,564 3 211,642	1,000 bushels 23, 153 23, 117 23, 760 18, 723 23, 609 22, 276 24, 300 19, 507 20, 430 22, 691	1,000 bushels 21, 200 18, 624 17, 578 13, 758 18, 473 12, 512 16, 704 15, 239 13, 592	1,000 bushels 3, 631 3, 858 3, 574 3, 536 3, 933 3, 672 4, 298 3, 917 4, 468

Bureau of Agricultural Economics. Compiled from official sources.

Acres from which all or part of the beans grown were gathered.
 Including acres planted in corn reduced to equivalent solid acres as well as the acreage grown alone.
 Including beans grazed or otherwise utilized as well as those gathered.
 Total production (except hay) multiplied by price of gathered beans to give approximate total value

Manchuria produces about 97 per cent of the bean production of China. Production figures for China are not available.
 Subject to revision.
 Preliminary.

Table 269.—Soybeans and soybean oil: International trade, average 1925-1929, annual 1928-1930

## SOYBEANS

				Calend	ar year			
Country	Average,	1925-1929	19	28	19	29	193	30 1
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES China 3	1,000 pounds 3,731,214	1,000 pounds 0	1,000 pounds 4,780,513	1,000 pounds 0	1,000 pounds 5, 468, 725	1,000 pounds 0	1,000 pounds 3,810,478	1,000 pounds 0
PRINCIPAL IMPORTING COUNTRIES								
Germany Japan Denmark United Kingdom	5, 574 0 0	1, 390, 622 1, 015, 825 394, 965 305, 643 166, 799	5,714 0 0	1, 868, 891 1, 040, 128 472, 469 429, 014 199, 528	1 0	2, 257, 198 1, 261, 690 518, 753 454, 689 221, 231	4, 938 0 0 2	388 593
Sweden Italy Netherlands United States 4	8 42 1, 192 0	97.395	9 463	141, 478 40, 180	110 487	194, 652	10 328	17, 733 42, 393
Total	6, 808	3, 433, 823	6, 186	4, 195, 944	6, 335	5, 020, 854	5, 278	3, 678, 614
		so	YBRAN	OIL				
PRINCIPAL EXPORTING COUNTRIES								
China	244, 894 45, 828 36, 742 14, 393 12, 917	30, 004 3, 670 323	73, 140 46, 466 10, 870	2, 466 1, 267 4 842	103, 862 43, 690 14, 739	0 4, 376 699 4 500 10, 434	34, 157	28, 833 2, 084

Bureau of Agricultural Economics. Official sources except where otherwise noted.

Table 270.—Soybeans: Estimated average price per bushel, received by producers, United States, 1922-23 to 1931-32

Season beginning October—	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Weighted average
1922-23 1923-24 1924-25 1925-26 1925-27 1927-28 1928-29 1928-30 1930-31 1931-32	Dollars 1.89 2.09 2.23 2.27 1.97 1.86 1.72 1.79 1.64 .58	Dollars 2.06 2.11 2.16 2.18 1.85 1.70 1.69 1.70 1.48	Dollars 1, 97 2, 11 2, 36 2, 17 1, 83 1, 61 1, 70 1, 72 1, 44 61	Dollars 2, 07 2, 23 2, 59 2, 38 1, 90 1, 70 1, 82 1, 85 1, 46	Dollars 2 13 2 26 2 64 2 33 2 03 1 69 1 93 1 91	Dollars 2.00 2.12 2.29 2.23 1.89 1.72 1.75 1.50

Bureau of Agricultural Economics. Based upon returns from special price reporters. Monthly prices-by States, weighted by production to obtain a price for the United States; yearly price obtained by weight, ing monthly prices by estimated monthly marketings. For previous data see 1980 or earlier Yearbooks.

<sup>1</sup> Preliminary.
2 These figures are for yellow beans, including mostly soybeans, according to Agricultural Commissioner Paul O. Nyhus.
5 3-year average.
4 Imports for consumption.
5 International Yearbook of Agricultural Statistics.

Table 271.—Soybeans for seed: Average wholesale selling price per bushel at Baltimore and St. Louis, 1922-1931

			Baltı	more					St. 1	ouis		
Year	Jan.	Feb.	Mar.	Apr.	May	Aver- age	Jan.	Feb.	Mar.	Apr.	May	Aver- age
1922 1923 1923 1924 1925 1926 1927 1928 1929 1930 1930	Dolls. 1. 90 2. 40 2. 10 2. 85 2. 00 1. 80 1. 95 2. 25 2. 10 2. 25	Dolls. 2.10 2.40 2.40 2.95 2.05 1.80 1.90 2.35 2.10 2.25	Dolls. 2.10 2.40 2.40 3.15 2.10 1.80 1.95 2.40 2.10 2.25	Dolls. 2. 10 2. 30 2. 70 2. 95 2. 15 1. 80 1. 95 2. 40 2. 25 2. 25	Dolls. 2.00 2.25 3.00 2.35 2.75 1.85 2.15 2.70 2.65 2.25	Dolls. 2.04 2.35 2.52 2.85 2.21 1.81 1.98 2.42 2.25	Dolls. 2.40 8.00 2.80 2.40 2.15 2.70 1.80 2.55 2.15 1.80	Dolls. 2 40 2 85 2 80 2 40 2 15 2 70 1 80 2 55 1 80	Dolls. 2.50 2.70 2.80 2.40 2.30 2.40 1.85 2.60 2.25 1.80	Dolls. 2, 30 2, 70 2, 80 2, 25 2, 55 2, 50 2, 00 2, 75 2, 25 1, 80	Dolls. 2.75 2.95 2.75 2.10 2.90 2.70 2.25 2.85 2.25 1.95	Dolls. 2 47 2 84 2 79 2 31 2 41 2 60 1 94 2 66 2 23 1 83

Bureau of Agricultural Economics. Compiled from weekly reports to the bureau from seedsmen in the various markets. These prices are the average wholesale selling prices for high-quality seed.

Table 272.—Soybean oil: Quantity of beans crushed and quantity of crude oil produced, 1922-23 to 1930-31

Year beginning October		Soyt	cans cro	shed		Oil produced						
	Oct Dec.	Jan Mar.	Apr June	July- Sept.	Total	Oct Dec.	Jan Mar.	Apr June	July- Sept.	Total		
1922-23 1922-24 1924-26 1925-26 1925-27 1927-22 1927-23 1929-30 1929-30	1,000 pounds 2, 708 2, 230 3, 550 5, 486 5, 132 8, 788 11, 480 30, 658 43, 546	1,000 pounds 3, 876 3, 232 7, 478 7, 746 6, 804 10, 278 21, 190 25, 288 64, 630	1,000 pounds 2, 350 564 3, 038 7, 450 6, 032 8, 792 9, 666 20, 716 77, 346	1,000 pounds 594 102 4,336 358 2,104 5,654 10,560 14,324 58,432	1,000 pounds 9, 528 6, 128 18, 402 21, 040 20, 072 33, 512 52, 896 99, 986 243, 954	1,000 pounds 364 286 477 728 735 1,164 1,506 5,231 6,194	1,000 pounds 768 388 870 990 862 1,259 3,046 3,343 9,086	1,000 pounds 272 72 360 874 776 1,132 1,277 2,905 10,996	1,000 pounds 78 13 562 46 286 789 1,456 1,945 8,391	1,000 pounds 1,482 759 2,269 2,638 2,659 4,374 7,285 13,424 34,607		

Bureau of Agricultural Economics. Compiled from reports of the Bureau of the Census, "Animal and vegotable fats and oils."

Table 273.—Soybean oil, crude, in barrels: Wholesale price per pound, Saturday nearest the 15th of the month, New York, 1922-1931

Calendar year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1922. 1923. 1924. 1925. 1926. 1927. 1928. 1929. 1930.	Cents 8. 88 11. 19 11. 62 13 25 13. 38 12. 00 12. 12 12. 38 12. 25 10. 12	Cents 9, 12 11, 69 12, 50 13, 25 13, 38 12, 12 12, 12 12, 28 12, 25 8, 75	Cents 10. 88 12. 62 12. 50 13. 25 13. 38 12. 12 12. 12 12. 38 11. 38 8. 75	Cents 11. 38 13. 12 11. 75 13. 38 13. 38 12. 12 12. 12 12. 00 11. 38 8. 75	13. 12 12. 38 13. 38 13. 38 12. 38 12. 12 11. 75 11. 12 8. 75	12.62 12.00 13.38 13.50 12.12 12.38 11.75 10.88 8.75	11. 88 12. 38 13. 38 14. 00 12. 12 12. 38 11. 75 10. 88 8. 75	11. 62 12. 50 13. 38 14. 00 12. 12 12. 38 11. 12 10. 88 8. 75	11. 62 12. 75 13. 38 14. 00 12. 12 12. 38 11. 12 10. 88 8. 75	Cents 10. 00 10. 88 12. 25 13. 38 14. 00 12. 12 12. 38 112. 62 10. 38 8. 75	Cents 10. 38 11. 00 13. 12 13. 38 13. 00 12 12 12. 38 12. 62 10. 12 8. 75	Cents 10. 88 11. 38 13. 38 12. 00 12. 12. 12. 25 10. 12. 8. 75

Bureau of Agricultural Economics. Compiled from the Oil, Paint, and Drug Reporter. See 1930 Yearbook, p. 798, Table 300, for data for earlier years.

<sup>&</sup>lt;sup>1</sup> Beginning October, 1929, reported as imported.

Table 274.—Cowpeas: Acreage, production, and value, by States, 1930 and 1931

!	Peas gather							T	otal, e	except	hay		Farm price				
State	fro wh		gath	ered acre	To quar gath	itity	T(	otal res 2	Yield act	d per	Total duct	l pro- ion <sup>3</sup>	Dec.	Dec. 1 of peas gathered		Value of total pro- duction except hay4	
	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	
Ind III M0 Kans Del Md Va N. C S. C Ga Fla Ky Tenn Ala Miss Ark La Okla Tex	1,000 acres 5 41 16 17 78 47 78 47 26 53 322 21 17 13 65	8 59 18 1 2 1 7	5. 5 6. 0 5. 0 11. 0 8. 5 9. 0 10. 0 8. 5	10. 5 10. 0 11. 5 6. 0 11. 0 11. 0 12. 0 8. 5 9. 5 9. 8 11. 5	266 128 6 5 36 187 663 423 80 34	bus. 63	41 16 1 1 10 45 107 75 21 8	acres 6 59 18 1 1 13 82 153 136 21 12 36 100 71	Bus. 8.55 6.50 5.60 5.00 11.00 9.00 9.00 9.8	10.5 10.0 11.5 11.0 11.0 11.0 11.5 11.5	1,000 bus. 42 266 128 6 5 60 495 210 675 210 68 130 495 378 423 360 138 1,127	63 590 207 6 222 200 143 984 1,300 1,292 206 138 1,100 690 923	1. 90 1. 75 2. 20 1. 740 2. 35 2. 90 2. 1. 80 2. 2. 20 2. 1. 85 2. 20 2. 20 20 20 20 20 20 20 20 20 20 20 20 20 2	. 65 . 95 1. 75 1. 00 1. 00 . 80 . 95 1. 25 . 90 . 75 . 95 1. 10 1. 65	80 466 282 10 14 1,040 1,638 1,350 51 1,50 273 916 756 909 936 331	44 384 197 10 22 143 787 845 1, 227 258 124 158 825 656 1, 015 835	
T, 8	452	685	8. 5	10. 1	3, 850	6, 932	674	1,016	8.8	10.3	5, 922	10, 468	2. 02	. 93	11,992	9, 709	

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

Table 275.—Cowpeas: Estimated average price per bushel received by producers, United States, 1922-23 to 1931-32

Crop year	Aug. 15	Sept.	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Weight- ed aver- age
1922-23 1922-24 1924-25 1926-25 1926-27 1926-27 1927-28 1928-29 1929-30 1929-30 1930-31	Dolls. 1.66 2.08 2.56 3.24 3.22 1.84 2.01 2.99 2.66 1.63	Dolls. 1.57 1.87 2.41 3.12 2.79 1.80 1.82 2.49 2.41 1.27	Dolls. 1. 54 1. 94 2. 32 2. 93 2. 34 1. 70 1. 83 2. 30 2. 20 . 98	Dolls. 1. 64 1. 95 2. 34 2. 98 2. 05 1. 72 1. 83 2. 22 2. 05 . 93	Dolls. 1. 67 2. 01 2. 56 2. 87 1. 95 1. 65 2. 02 2. 28 1. 86 . 93	Dolls. 1.87 2.12 2.82 3.03 1.94 1.71 2.15 2.40 1.80	Dolls. 1. 98 2. 21 3. 16 3. 21 1. 94 1. 74 2. 45 2. 59 1. 75	Dolls. 1. 98 2. 32 3. 43 3. 37 1. 89 1. 76 2. 63 2. 73 1. 82	Dolls. 2.08 2.46 3.67 3.50 1.93 1.86 2.88 2.85 1.87	Dolls. 2.08 2.53 3.70 3.43 1.90 2.00 3.05 2.93 1.93	Dolls. 2.17 2.82 3.84 3.47 1.90 2.09 3.24 3.00 1.96	Dolls, 2, 21 2, 86 3, 67 3, 47 1, 93 2, 09 2, 93 1, 89	Dalls. 1. 73 2. 14 2. 73 3. 09 2. 21 1. 80 2. 18 2. 48 2. 10

Bureau of Agricultural Economics. Based upon returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by estimated monthly marketings. For previous data see 1930 or earlier Yearbooks.

Acres from which all or part of the peas grown were gathered.
 Including acres planted in corn reduced to equivalent solid acres as well as the acreage grown alone.
 Acreage cut for hay is included in table of legume hay.
 Including peas grazed or otherwise utilized as well as those gathered.
 Total production (except hay) multiplied by price of gathered peas to give approximate total value.

Table 276.—Cowpeas for seed: Average wholesale selling price per bushel at Baltimore and St. Louis, 1922-1931

			Balti	more		St. Louis						
Year	Jan- uary	Feb- ruary	March	April	Мау	Aver- age	Jan- uary	Feb- ruary	March	April	May	Aver- age
1922. 1923. 1924. 1925. 1926. 1927. 1928. 1929. 1930.	Dolls. 2, 20 2, 55 3, 00 3, 90 4, 25 2, 25 1, 80 2, 85 8, 30 8, 00	Dolls. 2, 40 2, 55 3, 30 3, 90 4, 25 2, 25 1, 80 3, 30 3, 30 2, 00	Dolls. 2. 40 2. 555 3. 15 3. 90 4. 25 2. 15 2. 05 3. 30 2. 50	Dolls. 2.40 2.55 3.40 3.90 4.25 2.10 2.20 3.75 3.30 2.50	Dolls. 2 40 2 55 3 45 8 95 4 20 2 10 2 30 8 75 3 30 2 55	Dolls. 2. 36 2. 55 3. 26 3. 91 4. 24 2. 17 2. 03 3. 48 3. 30 2. 69	Dolls. 1. 90 3. 00 2. 75 3. 90 4. 50 2. 40 2. 40 3. 50 3. 15 2. 40	Dolls. 1. 90 2. 95 2. 95 4. 00 4. 45 2. 40 3. 60 3. 15 2. 40	Dolls. 2. 20 2. 85 3. 00 4. 10 4. 20 2. 40 3. 60 3. 15 2. 40	Dolls. 2, 25 2, 85 3, 05 4, 10 4, 10 2, 40 2, 50 3, 70 3, 10 2, 40	Dolls. 2. 25 2. 95 3. 55 4. 10 4. 05 2. 40 2. 70 3. 75 8. 00 2. 55	Dolls. 2. 10 2. 90 8. 00 4. 04 4. 26 2. 40 2. 48 3. 63 3. 11 2. 43

Bureau of Agricultural Economics. Compiled from weekly reports to the bureau from seedsmen in the various markets. These prices are the average wholesale selling prices for high-quality seed.

Table 277.—Velvet beans: Acreage, production, and December 1 price, by States, 1929-1931

State	Total acres for all purposes			Yield per acre of beans in the hull 1			Total production of beans in the hull <sup>1</sup>			Price per ton re- ceived by produc- ers Dec. 1		
	1929	1930	1931 3	1929	1930	1931	1929	1930	1931 2	1929	1930	1931
South Carolina	1,000 acres 67 649 136 296 38 33	340 35 33	506 127 306 32 33	900 780 1, 480 1, 150	880 650 580 950 650	660 800 700 1, 380 950	286 61 115 28 19	268 40 99 17 11	16	16. 00 13. 50 13. 50 14. 00 16. 00	13. 00 13. 50 16. 00 16. 00	10. 85 9. 70 9. 35 9. 70 11. 20 11, 20

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

Table 278.—Broomcorn: Acreage, production, and November 15 price, United States, 1915–1931

Year	Acreage	Average yield per acre	Produc- tion	Price per ton received by pro- ducers Nov. 15	Year	Acreago	Average yield per acre	Produc- tion	Price per ton received by pro- ducers Nov. 15
1915 1916 1917 1918 1919 1920 1921 1922 1923	Acres 230, 100 235, 200 345, 000 366, 000 352, 000 275, 500 222, 000 275, 000 536, 000	Pounds 454.1 329.3 332.8 340.4 303.4 265.0 344.2 271.3 302.8	Short tons 52, 242 38, 726 57, 400 62, 300 53, 400 36, 500 38, 200 37, 300 81, 153	Dollars 91. 67 172. 75 292. 75 233. 87 154. 57 126. 16 72. 20 219. 46 160. 06	1924 1925 1926 1927 1928 1929 1930 1931 3	Acres 436, 000 214, 000 306, 000 237, 000 298, 000 310, 000 391, 000	Pounds 356. 7 275. 7 355. 6 337. 6 363. 1 305. 2 254. 7 310. 0	Short tons 77, 800 29, 500 54, 400 40, 000 54, 100 47, 300 49, 800 47, 900	Dollars 95. 81 1 143. 02 2 78. 77 2 109. 50 2 104. 21 2 122. 83 2 73. 61 2 51. 15

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>&</sup>lt;sup>1</sup> The figures refer to the yield and entire production of velvet beans in the hull and not merely to those gathered. The pods are gathered from one-fourth to one-third of the acreage and most of these are ground for feed, only enough being shelled to supply seed. A large proportion of the crop is grazed.

<sup>2</sup> Preliminary.

<sup>&</sup>lt;sup>1</sup> Weighted average of the season to Dec. 1.

Dec. 1, price.

<sup>8</sup> Preliminary.

Table 279.—Broomcorn: Acreage, production, and December 1 price, by States 1928-1931

State		Acr	eage		Average yield per acre					Produ	uction		Price per ton received by producers Dec. 1			
	1928	1929	1930	1931 1	1928	1929	1930	1931	1928	1929	1980	1931 1	1928	1929	1930	1931
III		acres 21 1 50 125	acres 28 1 60 164 10	33 1 24 151 11 46 43	430 450 350 311 360 272	502 300 280 287 294 286 319	220 246 208 285 270 220	320 298 200 300 250 335	900 9,700 22,900 1,400 9,400 5,200	200 7,000 17,900 1,500 9,200 6,200	7, 400 17, 100 1, 400 10, 400 5, 600	200 3, 600 19, 600 1, 600 5, 800 7, 200	90 96 111 107 85 90	175 90 115 120 112 112 113	110 85 60 82 75 51 57	67 60 50 52 41 42 37
T. 8	298	310	391	309	363. 1	305. 2	254. 7	310. 0	54, 100	47, 300	49, 800	47, 900	104, 21	122, 83	73. 61	51. 15

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

Table 280.—Broomcorn: Supply and distribution, 1924-1931

#### Year beginning June-

	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32
Supply: Stocks June 1— Manufacturers Dealers 1— On farms	Tons 15, 169 15, 489 6, 133	Tons 20, 960 25, 043 6, 024	Tons 16, 201 9, 706 3, 265	Tons 18, 173 11, 498 2, 709	Tons 18, 744 5, 938 1, 206	Tons 19,591 7,495 823	Tons 14, 980 6, 667 1, 043	Tons 17, 088 4, 560 2, 326
Total carry-over Production Imports	36, 791 78, 200 136	52, 027 29, 500 ( <sup>3</sup> )	29, 172 54, 400 (8)	32, 380 40, 000 193	25, 888 54, 100 (³)	27, 909 47, 300 (³)	22, 690 49, 800 (³)	23, 980 2 47, 900
Total supply available  Distribution: Exports 4  Domestic use Stocks on hand May 31	115, 127 5, 580 5 57, 520 52, 027	81, 527 4, 688 47, 067 29, 172	. 83, 572 4, 701 46, 491 32, 380	72, 573 4, 591 41, 894 25, 888	79, 988 4, 931 47, 148 27, 909	75, 209 4, 985 47, 534 22, 690	72, 490 4, 557 43, 953 23, 980	6 71, 880

Bureau of Agricultural Economics.

Table 281.—Hay: Receipts at principal markets, 1924-25 to 1930-31

Year be- ginning July	Boston	New York	Pitts- burgh	Cincin- nati	Chicago	Minne- apolis	St. Louis	Kansas City	Omaha	San Fran- cisco
1924-25 1925-26 1926-27 1927-28 1928-29 1929-30 1930-31	Short tons 46, 188 35, 340 36, 504 32, 400 26, 964 21, 708 16, 356	Short tons 126, 636 97, 080 71, 160 48, 996 37, 236 33, 768 40, 452	Short tons 55, 752 49, 980 65, 172 42, 720 29, 916 26, 232 26, 160	Short tons 95, 760 43, 752 46, 056 71, 052 79, 152 67, 392 69, 012	Short tons 127, 740 117, 372 108, 756 91, 728 95, 016 70, 308 55, 416	Short tons 59, 724 45, 732 59, 100 41, 340 36, 300 33, 072 35, 532	Short tons 81, 240 82, 392 68, 172 53, 592 53, 244 60, 120 51, 876	Short tons 303, 924 318, 000 270, 756 240, 720 247, 296 216, 852 160, 872	Short tons 62, 520 62, 268 75, 936 64, 800 76, 488 65, 820 71, 556	Short tons 53, 448 49, 032 46, 572 37, 200 45, 060 47, 268 52, 224

Bureau of Agricultural Economics. Compiled from weekly reports from the various markets to the Grain, Hay, and Feed Market News Service of the Bureau of Agricultural Economics.

<sup>&</sup>lt;sup>1</sup> Preliminary.

<sup>&</sup>lt;sup>1</sup> Storage stocks reported by dealers include manufacturers' stocks held by dealers at country shipping points.
Dec. 1 estimate.
Less than 100 tons.

For crop year, June 1-May 31.
 Includes broomcorn destroyed by warehouse fire.
 Not including possible imports.

Table 282.—Hay: Acreage, production, December 1 price, exports, etc., United States, 1919-1931

			Тя	me hay				W	'ild hay	
Year	Acre- age	Average yield per acre	Produc- tion	Price per ton re- ceived by pro- ducers, Dec. 1	Domestic exports, year be- ginning July 1	Imports, year be- ginning July 1 1	Acre- age	Yield per acro	Produc- tion	Price per ton re- ceived by pro- ducers, Dec. 1
1919	1,000 acres 55,853	Short tons 1.34	1,000 short tons 74,724	Dollars	1,000 short tons	1,000 short tons	1,000 acres	Short tons	1,000 short tons	Dollars
1919 1920 1921 1922 1923	56, 020 56, 781 57, 462 59, 300 57, 741 59, 075	1. 35 1. 32 1. 21 1. 34 1. 28	74, 724 75, 357 75, 074 69, 718 79, 650 74, 140	20. 19 17. 75 12. 09 12. 56 14. 13	67 55 61 53 24	252 126 5 35 403	17, 124 16, 291 15, 651 16, 181 15, 864	0. 93 . 95 . 88 . 90 . 90	15, 891 15, 533 13, 811 14, 501 14, 312	16. 52 11. 38 6. 57 7. 30 8, 16
1924 1925 1926 1927 1927 1928 1930 1931	59, 066 54, 999 54, 750 56, 754 53, 287 55, 019 52, 622 53, 449	1. 35 1. 22 1. 22 1. 46 1. 35 1. 88 1. 21 1. 20	79, 877 66, 965 66, 916 83, 116 71, 920 76, 114 63, 463 64, 233	13. 79 13. 94 14. 07 11. 29 12. 23 12. 19 12. 62 9. 06	25 18 15 17 14 9 7	119 431 209 84 40 60 136	15, 166 14, 685 13, 337 14, 535 12, 924 13, 586 13, 793 11, 977	. 83 . 79 . 68 1. 03 . 90 . 82 . 73 . 68	12, 601 11, 643 9, 098 15, 003 11, 650 11, 194 10, 751 8, 133	7. 92 8. 55 10. 04 0. 59 7. 25 8. 04 7. 10 6. 18

Bureau of Agricultural Economics. Italic figures are census returns; other acreage, production, and yield figures are estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text. See 1927 Yearbook, p. 927, for data for earlier years.

<sup>2</sup> Preliminary.

Table 283.—IIay, tame: Estimated price per ton received by producers December 1, average 1925-1929, and annual 1927-1931

State	Av., 1925– 1929	1927	1928	1929	1930	1931	State	Av., 1925– 1929	1927	1928	1929	1930	1931
Me	12. 40 13. 50 12. 72 13. 28 10. 90 11. 44 8. 24 9. 70 11. 02 10. 98 17. 78 16. 32 17. 46	12. 70 16. 30 11. 70 21. 00 21. 00 21. 30 11. 30 11. 50 10. 40 11. 40 11. 50 9. 90 7. 80 7. 80 16. 50 16. 50	11. 40 14. 10 11. 60 19. 10 22. 00 18. 90 11. 30 12. 50 12. 90 11. 4. 40 9. 70 13. 00 14. 40 9. 70 10. 60 10. 40 10. 40 11. 50	19. 20 22. 00 19. 10 12. 20 13. 60 10. 10 10. 10 10. 50 11. 30 11. 00 11. 00 11. 50 11. 50 11. 50 11. 50 11. 50	10, 90 13, 70 11, 90 12, 60 22, 60 20, 20, 40 21, 60 14, 60 17, 40 13, 10 14, 60 12, 70 12, 70 12, 50 22, 50 22, 40	9.50 11.550 17.90 17.90 17.80 14.20 16.80 16.20 11.20 11.20 11.20 11.20 11.20 11.20 11.20 11.20 11.20 11.20 11.20	N. C. S. C. Ga. Fin. Ky. Tenn. Ala Miss Ark. La. Okla Tex. Mont Idalio Wyo Colo N. Mex. Ariz. Nev. Utah. Wash. Oreg. Calif. U. S	19. 14 17. 44 10. 42 17. 60 17. 60 15. 58 15. 68 15. 06 13. 02 13. 82 10. 04 9. 60 9. 74 14. 30 12. 02 13. 94	18. 00 18. 00 16. 30 14. 50 15. 00 15. 00 11. 80 10. 70 11. 80 8. 70 9. 20 14. 40 9. 20 11. 20 11. 20 11. 20	17. 30 18. 50 19. 00 16. 50 15. 20 15. 20 14. 40 12. 70 13. 20 11. 70 11. 70 12. 10 11. 70 13. 10	15. 70 17. 50 16. 50 18. 60 13. 60 13. 70 12. 40 10. 80 12. 20 11. 50 18. 10 18. 60 16. 80 16. 80 16. 40	19. 30 18. 80 17. 00 19. 70 20. 10 15. 10 16. 50 13. 50 11. 50 11. 50 11. 00 12. 50 13. 50 13	13. 00 11. 90 10. 00 12. 70 10. 00 11. 00 9. 60 8. 30 8. 80 9. 00 9. 20 7. 80 9. 20 7. 60 11. 00 10. 70 9. 80 8. 80

Bureau of Agricultural Economics. As reported by crop reporters.

<sup>&</sup>lt;sup>1</sup> Compiled from Commerce and Navigation of the United States, 1910–1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June issues, 1919–1926; January and June issues, 1927–1931, and official records of the Bureau of Foreign and Domestic Commerce.

Table 284.—Hay: Acreage, yield, and production, by States, averages, and annual 1930 and 1931

			1981	1,000 short tons 5 6 6 6 1 1 1 13	26	1, 288 1, 382 1, 382 1, 382 1, 382 1, 582 1, 582 1, 582 1, 582	5, 891	847080
		Wild hay	1830	1,000 short tons 4 3 3 5 6 6 1 1 4 1 4 1 9	88	2 14 1286 1,736 1,736 1,436 1,351 2,176	8,097	엄성쇼쇼디영
	ıction	Α	Aver- age, 1924- 1928	1,000 short fons fons 10 10 10 2 2 2 2 5 10 10 10 10 10 10 10 10 10 10 10 10 10	143	13 13 268 1, 978 1, 978 1, 856 1, 625 2, 151 875	8, 749	285184
	Production	_	1981 1	1,000 short tons 1047 1,213 481 481 481 323 5,288 5,288 3,154	12, 179	8.4.4.4.8.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4	28, 347	106 469 993 650 677
1		Гаше ћау	1930	1,000 short tons 868 1,084 427 427 427 427 43 3,001 3,001	10,997	1,1,2,4,6,4,6,1,1,2,4,6,6,1,1,2,4,6,4,6,1,1,9,4,6,4,6,4,6,4,6,4,6,4,6,4,6,4,6,4,6,4	29, 429	308 424 317 532 141
		-	Aver- age, 1924- 1928	1,000 short tons 898 388 1,083 44 3,58 5,845 3,754	12, 989	2,2,2,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3	35, 177	100 524 835 835 159
			1981	Short tons 1.90	1.06	5.88.1. 8.8.5.5.5.3.3.3.3.3.3.3.3.3.3.3.3.3.3.3.	. 4	36.8.8.1.8.
		Wild hay	1930	Short tons 0.08 0.08	1.01	8.8.8.8.8.8.8.8.8.8.8.8.8.8.8.8.8.8.8.	.76	 888454
	Yield per acre		Aver- age, 1919- 1928	Short tons 0.89 0.99 0.98 0.98 0.98 0.98 0.98 0.98	1.00	1	.85	1. 28. 20.1. 1.10. 18.
	Yield 1	6	1931	80 20 20 20 20 20 20 20 20 20 20 20 20 20	1.28	111111111 11 2332828485484	1, 10	1.23 1.10 1.10 2.85 73
		Твте ћау	1930	Skort tons tons 0.88 1.11 1.13 1.13 1.55 1.20	1.15		1, 13	2.00 28. 28. 28. 28.
		-	Aver- 8ge, 1919- 1928	Short tons 0.84 1.94 1.18 1.18 1.18 1.16 1.16 1.16 1.16	1, 14	11111111111111111111111111111111111111	1.28	1.23 1.03 1.05 24.
			1931 1	1,000 acres 5 6 6 6 1 1 1 123 123	88	1, 786 1, 786 1, 786 1, 786 2, 786 892	9, 209	2 2 9 9 2 11
		Wild hay	1930	1,000 acres 6 6 6 6 4 6 6 113 113	2.6	4 8 8 4 4 8 8 9 4 8 8 9 4 9 8 9 9 9 9 9	10, 596	288182
	Acreage		Aver- 8ge, 1924- 1928	1,000 acres 10 10 10 10 10 10 10 10 10 10 10 10 10	140	7,1 1,2 2,2 3,3 1,4 6,	10,853	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
	Act	4	1931 1	1,000 acres 962 344 907 334 334 334 34 34 34 360 3,900 2,455	9, 483	2142424244111 22444232222222222222222222	25, 883	381 381 904 648 715
		Тате рау	1930	1,000 acres acres 350 912 386 386 386 386 386 259 3,955 205 205 206	9, 525	414444444 \$583818135888	26,076	885888
			Aver- age, 1924- 1928	1,000 acres 1,067 378 372 372 372 4,674 4,674 283	10, 863	4,1,0,0,0,0,0,0,1,1,1,1,0,0,0,0,0,0,0,0,	27,748	8888 855 855 855 855 855 855 855 855 85
		State and director		Maine	North Atlantic	Ohlo Indiana Indiana Illinois Michigan Wisconsin Wisconsin Minnesota. Iowa Iowa North Dakota South Dakota Kanssa	North Central	Delaware

17	74	0 8 8 8 5 1 1 2 8 8 8 1 1 1 2 8 8 8 1 1 1 1 1 1 1	882	241 933 280 280 280 281 38 38 1,189	8, 133
35	8	10 22 22 23 101 131 405 166	775	373 87 232 232 366 18 12 12 143 143 143 143 143 143 143 143 143 143	10, 751
818	25	30 39 37 141 1483 158	884	600 121 283 283 284 281 151 151 151 158 188 188 188 188 188 1	12,000
380 846	3, 479	1, 208 1, 176 440 701 279 268 668	5, 454	1,482 1,151 1,647 1,647 386 881 1,738 1,538 3,679 14,774	64, 233
312	2, 140	629 770 306 237 432 187 187	3, 530	1,726 2,489 3,215 3,215 1,236 1,236 1,536 1,768 4,231	63, 463
292	3,441	1, 172 1, 154 361 344 564 205 661	5,019	1,950 9,897 9,895 1,289 1,702 1,702 1,592 4,040 17,133	73, 759
8.2	28.	. 80 . 80 . 80 . 110 110 115 . 83	88.	86.1 68.0 68.0 68.1 68.1 7.1 88.0 87.0 87.0 87.0 87.0 87.0 87.0 87.0	8
8.8	.71	5258888	.75	28. 28. 28. 38. 38. 38. 38. 1. 38. 1.	.78
2.0 28.	1,00	. 82 . 81 1.06 1.08 1.18 1.03	1,00		88.
22.23	\$.	1.05 78 1.28 1.28 1.128 1.128	1.08	1 212222222222222222222222222222222222	1.20
8.8	.65	. 55 	.79	1 21 22 22 22 22 22 22 22 22 22 22 22 22	1.21
28	8.	11.1111 884883888	1.08	14111444114	1.31
61 4	æ	082488 158 158 158 158 158 158 158 158 158 1	883	- - - - - - - - - - - - - - - - - - -	11, 977
64	84	258 258 258 258 258 258 258 258 258 258	1,031	77 25 25 25 25 25 25 25 25 25 25 25 25 25	13, 793
71	æ	88884 41 26 71	256	83 88 88 88 7 7 7 8 8 8 8 8 8 8 8 8 8 8	14, 129
82	3, 708	1,1,1,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2	5,049	1,688 1,788 1,288 1,288 1,288 1,784 1,785	53, 440
73	3,277	-1-1 E8888888	4, 468	1, 619 1, 633 1, 252 1, 1, 120 2, 252 8, 635 8, 64 8, 64 1, 715 9, 276	52, 622
88	3, 667	111 22:482:333	4,819	1, 235 1, 236 1, 280 1, 280 1, 280 1, 280 1, 280 1, 626 8, 674	55, 771
Georgia Florida	South Atlantic	Kantucky Tamnesse Alabama Missisatippi Lytkinssi Louisiana Oklahoma	South Central	Montana Idaho. Idaho. Vyoning Colorado Arixona Marico Arixona Vitaha Vitaha Washington California Wastington California	United States

Bureau of Agricultural Economics. Estimates of the crop-reporting board, revised, 1919 to 1928. See Introductory text. 1 Preliminary.

Table 285.—Hay, tame, by kinds: Production by States, 1931 1

State		•								
Maine	State	Alfalfa	and timo-		deza (Japan	green	leg-	John- son, Sudan grass, and		for forage and
Ohio	New Hampshire Vermont Massachusetts Rhode Island Connecticut New York	short tons 25 10 24 19 2 27 539 83	short tons 659 245 953 362 27 190 4,158 228	short tons	short	short tons 8 12 40 10 2 13 72	short tons	short tons 255 110 196 90 13 93 510	tons 947 377 1, 213 481 44 323 5, 288 352	short
Indians	North Atlantic	980	9, 576			195	35	1, 393	12, 179	
Delaware	Ohio	367 576 978 813 1, 163 1, 061 308 242 256	997 1, 265 1, 403 2, 847 1, 130 1, 959 1, 730 32 30 114	23 29 42 26 128 65 24 237 31 46		51 16 28 50 63 57 125 484 220 80	525 577 9 16 134 402	54 210 84 81 272 36 195 102 21 186	2, 017 2, 673 2, 544 3, 833 2, 756 3, 312 2, 784 1, 097 558 2, 032	169 9 200
Maryland	North Central	8, 911	14, 282	707		1, 242	1, 795	1, 410	28, 347	1, 374
Kentucky         175         443         47         100         169         274         1, 208         140           Tennessee         45         307         130         68         292         333         1, 175         125           Alabama         6         5         5         13         335         113         477         65           Mississippi         59         3         88         6         166         118         440         58           Arkansas         155         106         29         82         161         168         701         183           Louisiana         45         36         2         124         72         279         17           Okiahoma         316         17         7         48         62         118         568         388           Texas         145         7         335         423         1,438         1,424         5,454         1,941           Montana         957         200         34         254         47         1,492         1           Idaho         1,802         193         111         7         64         100         775	Maryland Virginia West Virginia North Carolina South Carolina Georgia		812 527 474 84		49	16 48 26 75 11	63 216 30 351 141 284	16 114 102 108 23 50	469 993 650 677 178 360	28 20
Tennessee	South Atlantic	208	1, 459		49	198	1, 132	433	3, 479	88
Montans         957         200         34         254         47         1,492         1           Idaho         1,802         193         124         32         2,151         -           Wyoming         493         111         7         64         100         775           Colorado         1,152         199         10         150         20         116         1,617         165           New Mexico         266         14         36         20         336         108           Arizona         338         18         8         364         8         364         108           Utah         770         33         12         16         831         108         8         364         108         364         108         108         108         108         108         108         108         108         108         108         108         108         117         1,738         108         108         108         108         108         117         1,738         108         108         108         118         108         118         108         108         117         117         1,738         108         1	Tennessee Alabama Mississippi Arkansas Louisiana Oklahoma	45 6 59 155 45 316	307 5 3 106	7	130 5 88 29	68 13 6 82 2 48	292 335 166 161 124 62	333 113 118 168 72 118	1, 175 477 440 701 279 568	125 65 56 153 17 388
Idaho	South Central	946	881	7	335	423	1, 438	1, 424	5, 454	1,941
7,000	Idaho Wyoming Colorado New Mesico Arizona Utah Nevada Washington Oregon California	1, 802 493 1, 152 266 338 770 182 624 586 2, 699	193 111 199 14 33 18 391 188 49	7 10		124 64 150 36 18 12 5 606 516 802	20	32 100 116 20 8 16 18 117 248 129	2, 151 775 1, 617 336 364 831 223 1, 738 1, 538 3, 679	108
United States		9, 869	1, 396	51		2, 587	20	851	14, 774	273
	United States	20, 914	27, 594	765	384	4, 645	4, 420	5, 511	64, 233	3, 676

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

Preliminary.
 Excludes "sweetclover" and "Lespedeza."
 Not included in "All tame hay."

Table 286.—Hay: Estimated average price per ton received by producers, United States, 1922-23 to 1931-32

### ALL (LOOSE)

Crop year	July 15	Aug. 15	Sept.	Oct. 15	Nov. 15	Dec.	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	Weight- ed av- erage
1022-23 1923-24 1924-25 1925-26 1925-27 1927-28 1927-28 1928-29 1929-30 1930-31 1931-32	Dolls. 11. 44 11. 78 13. 49 12. 48 12. 96 11. 71 10. 86 11. 17 10. 47 9. 30	Dolls. 10. 78 11. 98 12. 95 12. 25 13. 04 9. 97 10. 39 10. 85 11. 31 9. 05	Dolls. 10. 68 12. 25 12. 68 12. 42 12. 88 10. 51 10. 59 11. 05 12. 14 8. 88	Dolls. 10. 87 12. 44 12. 64 12. 47 13. 68 10. 63 10. 60 11. 07 12. 17 8. 57	Dolls. 11. 38 12. 75 12. 88 13. 07 13. 22 10. 54 10. 89 11. 18 12. 19 8. 68	Dolls. 11. 82 13. 15 12. 69 13. 40 13. 47 10. 55 11. 23 11. 04 11. 33 8. 71	Dolls. 11. 98 13. 59 12. 70 13. 31 13. 38 10. 60 11. 61 11. 16	Dolls. 12.04 13.60 12.83 13.08 13.64 10.24 12.06 11.19 10.92	Dolls. 12 18 13 63 12 39 12 97 13 48 10 19 12 37 10 95 10 66	Dolls. 12.54 13.73 12.48 12.78 13.26 10.29 12.30 10.07	Dolls. 12. 82 13. 65 12. 17 13. 12 13. 20 10. 70 12. 15 10. 54	Dolls. 12. 32 13. 75 11. 82 12. 98 13. 10 11. 01 11. 88 10. 91 9. 97	Dolls. 11. 68 12. 93 12. 76 12. 83 13. 23 10. 57 11. 29 11. 05
					AL	ALF	Λ.						
1922-23 1923-24 1924-25 1925-20 1925-27 1927-27 1927-28 1928-29 1929-30 1930-31 1931-32	10. 61 12. 45 13. 19 13. 02 12. 94 11. 73 11. 98 13. 12 11. 44 9. 80	10. 54 12. 01 13. 84 13. 00 13. 15 11. 47 11. 82 13. 17 12. 10 9. 86	11. 15 12. 78 13. 59 12. 91 13. 13 11. 34 12. 20 13. 50 12. 85 9. 67	11. 87 13. 37 12. 85 13. 41 13. 29 11. 52 12. 82 13. 84 12. 97 9. 58	12. 70 13. 59 13. 91 13. 74 13. 79 11. 75 13. 29 14. 00 12. 94 9. 94	13. 31 14. 39 13. 40 14. 14 13. 57 12. 02 13. 90 14. 41 12. 52 10. 31	14. 06 13. 99 14. 50 13. 90 13. 83 12. 09 14. 54 14. 66 12. 21	14. 02 14. 08 14. 78 14. 24 14. 21 11. 84 15. 34 14. 45 11. 74	14. 33 13. 98 14. 44 13. 50 14. 38 12. 46 16. 07 13. 90 11. 20	14. 09 14. 09 14. 08 13. 53 13. 85 12. 56 16. 20 13. 42 11. 01	14. 40 14. 12 14. 34 13. 17 13. 59 12. 90 15. 50 12. 87 10. 87	13. 70 12. 83 13. 33 13. 03 12. 42 14. 50	12.82 13.54 13.81 13.52 13.57 11.96 13.00 13.71 11.99
				_	OL	OVEF	t.						
1022-23 1923-21 1923-21 1924-25 1925-26 1921-27 1927-28 1922-29 1929-30 1930-31 1931-32	12. 82 13. 52 15. 45 13. 03 14. 40 13. 11 12. 52 11. 00 11. 71 10. 30	12. 66 13. 51 14. 00 13. 67 14. 25 12. 16 12. 25 11. 61 13. 20 10. 15	12. 54 14. 12 13. 75 14. 06 14. 60 11. 78 12. 50 11. 82 14. 62 9. 81	12. 51 14. 73 13. 65 14. 09 14. 71 11. 91 12. 58 11. 77 14. 62 9. 65	12. 67 14. 94 13. 64 14. 74 14. 76 11. 86 13. 01 11. 82 14. 62 9. 65	13. 03 15. 82 13. 45 15. 24 15. 24 11. 91 18. 05 11. 97 13. 52 9. 70	140.07	13. 35 15. 93 13. 30 14. 82 16. 16 11. 96 13. 59 12. 24 12. 78	13. 24 16. 31 12. 52 14. 79 15. 64 12. 02 13. 93 12. 31 12. 45	13. 47 16. 08 12. 41 14. 88 15. 51 12. 23 13. 43 12. 27 12. 57	12. 67 15. 13	15. 95 12. 26 15. 07	15, 14 13, 43 14, 52 15, 06 12, 15 13, 02 11, 99
					TIM	отн	Y						
1922-23 1923-24 1923-24 1924-25 1924-26 1920-27 1927-28 1922-29 1923-30 1933-31 1931-32	14. 38 14. 86 16. 74 13. 89 16. 01 13. 29 11. 68 11. 91 12. 32 10. 77	13. 61 14. 68 15. 24 14. 06 15. 52 12. 03 11. 70 11. 61 13. 53 10. 07	13. 44 15. 13 14. 47 14. 98 15. 32 11. 70 11. 77 11. 60 14. 76 9. 79	13. 70 16. 22 14. 54 15. 11 15. 49 11. 58 11. 67 14. 82 9. 56	18. 93 16. 78 14. 00 15. 38 15. 62 11. 67 12. 18 11. 70 14. 87 9. 84	13. 91 16. 95 14. 37 15. 87 15. 81 11. 31 12. 35 11. 57 14. 58 9. 14	14. 41 16. 90 14. 29 15. 82 14. 58 11. 34 12. 45 11. 55	14. 46 17. 25 14. 24 15. 79 15. 82 11. 03 12. 99 11. 55 14. 86	14. 59 17. 53 13. 31 15. 59 15. 30 11. 14 13. 01 11. 57 14. 16	A L. /U	11. 78 12. 64 12. 04	17. 52 13. 05 16. 64 14. 97 11. 82 12. 57 12. 29	16. 53 14. 30 15. 40 15. 42 11. 61 12. 31 11. 71
	·	·	·		PR	ATRII	3		<del></del>				
1922-23 1924-24 1924-25 1924-25 1925-20 1927-28 1927-28 1928-20 1920-30 1930-31 1931-32	7. 68 9. 17 8. 35 8. 93 9. 63 9. 15 7. 80 8. 21 7. 12 6. 52	8. 97 8. 60 8. 55 10. 55 8. 65 7. 34 7. 96 7. 63	7. 54 8. 58 8. 49 9. 24 10. 52 7. 98 7. 62 8. 13 7. 89 6. 68	7. 74 9. 19 8. 25 9. 41 10. 78 7. 67 7. 71 7. 97 7. 66 6. 52	8. 13 9. 07 8. 25 9. 39 10. 70 7. 47 7. 72 8. 11 7. 48 6. 67	9. 26 8. 62 9. 78 10. 98 7. 55 7. 88 8. 18 7. 31	8. 84 9. 14 9. 73 11. 28 7. 41 8. 01 8. 30 7. 23	9. 52 8. 87 9. 08 9. 53 11. 76 6. 98 8. 33 8. 41 6. 82	9. 61 8. 66 9. 05 9. 48 11. 50 6. 79 8. 99 8. 11 6. 51	9. 74 8. 78 9. 11 9. 06 10. 70 6. 90 8. 81 8. 12 6. 44	8. 74 9. 27 9. 54	8. 54 8. 55 9. 79 10. 77 7. 59 8. 77 7. 78	8. 92 8. 70 9. 36 10. 87 7. 64 8. 10 8. 12

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by monthly marketings. Mean of prices of all loose hay reported on 1st of month and 1st of succeeding month, July, 1922-December, 1923. For previous data on alfalfa, clover, timothy, and prairie hay see 1930 or earlier Yearbooks.

Table 287.—Hay: Average price per ton at leading markets, by kind and grade, 1921-22 to 1930-31

	Alfalfa, Ci		Clov	er, Cinci	nnati		upland, s City	Timoth ca	ıy, Chi- go
Year beginning July	No. 1	No. 2	No. 1	No. 1, light mixed	No. 1, mixed	No. 1	No. 2	No. 1	No. 2
1921-22	Dollars 19. 75 22. 10 23. 60 20. 10 21. 10 19. 00 20. 80 24. 80 22. 10 19. 90	Dollars 13. 90 16. 80 16. 90 15. 00 17. 40 16. 60 16. 00 17. 90 17. 90	Dollars 19.80 16.40 23.90 22.50 22.90 24.10 17.20 23.60	Dollars 19.00 17.40 23.40 23.60 21.20 15.70 19.20 18.00 21.70	Dollars 17. 80 16. 40 22. 60 21. 70 16. 40 20. 90 17. 60 22. 50	Dollars 11. 70 14. 40 13. 90 11. 20 14. 20 14. 50 10. 90 12. 10 11. 70 12. 10	Dollars 10.00 12.90 12.60 9.80 12.70 8.90 10.50 10.50	Dollars 22, 30 28, 30 24, 70 21, 80 18, 60 22, 20 19, 00	Dollars  18. 50 23. 30 19. 50 21. 90 19. 70 16. 40 20. 20 16. 70 18. 50

Bureau of Agricultural Economics. Compiled from reports made direct to the bureau.

Table 288.—Alfalfa meal, No. 1 medium: Average price per ton, bagged, in car lots, Kansas City, 1922-23 to 1931-32

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Aver- age
1922-23 1923-24 1924-25 1924-25 1925-28 1920-27 1927-28 1922-29 1922-20 1920-30 1930-31	Dolls. 18. 60 21. 50 22. 00 23. 00 23. 00 21. 75 27. 60 23. 50 22. 70 17. 90	19. 50 22. 40 22. 60 24. 00 22. 80 25. 60 25. 00 24. 70	21. 20 25. 50 23. 25 24. 25 22. 25 23. 40 26. 00 27. 30 26. 60	24. 60 25. 70 23. 10 24. 40 22. 40 23. 10 26. 60 27. 50 25. 60	26. 25 26. 90 22. 50 24. 10 22. 75 26. 60 26. 80 25. 00	26. 20 25. 20 23. 90 24. 40 22. 30 23. 30 28. 60 27. 40 24. 20	25. 40 26. 25 24. 20 24. 80 22. 00 24. 40 29. 75 27. 40 23. 60	25, 40 23, 90 22, 50 24, 00 21, 75 26, 25 29, 90 25, 50	24. 40 23. 20 22. 25 23. 10 21. 40 28. 50 23. 60	26. 50 20. 90 22. 00 23. 90 21. 00 28. 00 25. 00	26. 10 21. 20 22. 70 25. 40 22. 20 34. 25 27. 00 23. 80	22, 90 23, 90 21, 60 31, 70 25, 10 22, 00	24. 00 23. 70 22. 80 24. 10 22. 10 26. 40 27. 40 25. 40

Bureau of Agricultural Economics. Compiled from reports made to the bureau.

TABLE 289.—Pasture: Condition, 1st of month, United States, 1909-1931

Year	Мау	June	July	Aug.	Sept.	Oct.	Year	May	June	July	Aug.	Sept.	Oct.
1900	P. ct. 79. 1 86. 9 83. 1 82. 9 85. 5 88. 9 88. 4 84. 8 79. 9 81. 6 91. 1 79. 3	P. ct. 86. 9 87. 1 82. 7 92. 5 88. 1 90. 0 92. 5 93. 1 89. 3 97. 4 90. 2	P. ct. 91.8 79.7 67.2 89.7 81.6 83.0 93.2 94.8 84.1 82.0 95.8 91.4	P. ct. 86. 4 71. 5 62. 7 57. 3 74. 3 76. 2 95. 5 5 72. 4 85. 8 87. 7	P. ct. 	P. et. 95. 9 76. 9 75. 5 73. 5 78. 9 86. 9	1921 1922 1923 1923 1924 1925 1928 1928 1929 1930 1931	P. ct. 90.0 85.9 79.4 82.4 82.2 74.6 87.0 71.3 87.3 87.3 88.9	P. ct. 89. 4 94. 6 86. 1 83. 2 76. 7 77. 0 88. 3 78. 6 87. 2 80. 4	P. ct. 84. 4 88. 5 87. 2 73. 0 77. 0 92. 8 84. 4 87. 5 73. 0	P. ct. 78. 3 86. 7 79. 4 82. 0 69. 5 69. 9 85. 6 79. 7 56. 7	P. ct. 82.1 78.7 80.2 76.6 67.4 78.2 83.3 67.1 47.7 63.0	P. ct. 84. 8 72. 7 85. 0 78. 6 72. 9 83. 7 80. 1 77. 7 70. 2 56. 1 63. 5

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

Table 290.—Pasture: 1 Condition, 1st of month, by States, average 1920-1929, and 1931

	М	ау	Ju	ne	Ju	ly	Au	gust	Septe	mber	Oct	ober
State and division	A ver- age, 1920- 1929	1931	A ver- age, 1920- 1929	1931	Aver- age, 1920- 1929	1931	Aver- age, 1920- 1929	1931	Aver- age, 1920- 1929	1931	A ver- age, 1920- 1929	1931
Maine	P. ct. 86 86 80 84 84 82 81 82 81	P. ct. 86 85 86 84 80 82 79 76 71	t:888888888888888888888888888888888888	P. ct. 90 93 89 87 91 89 85 81	P. ct. 87 87 91 87 88 87 85 79 84	4. 935 85 85 85 85 85 85 85 85 85 85 85 85 85	P. ct. 86 89 93 83 84 82 82 76 81	P. cl. 91 87 95 88 89 85 83 82	P. ct. 82 85 89 83 82 82 80 83	P. ct. 87 83 90 87 90 88 78 83 81	P. ct. 79 82 87 81 80 82 80 80 80	P. ct. 91 88 89 86 83 82 81 74
North Atlantic	81.8	77.4	85. 5	86. 6	85. 0	87.4	82. 5	85. 1	81.6	81.2	80. 2	80. 9
Ohio Indiana Illinois Michigan Wisconsin Michigan Wisconsin Minnesota Iowa Miscouri North Dakota South Dakota Nebraska Kansas	79 79 82 72 78 78 84 75 78 84 83	80 80 81 68 71 72 80 75 87 88	85 84 84 84 81 83 86 79 79 87	84 81 83 76 69 70 72 84 49 63 80 88	84 85 84 83 85 86 88 84 82 88 87	86 81 81 77 73 73 70 75 40 67 80	88 78 77 75 79 76 81 81 79 78 82 83	78 70 62 52 48 47 50 56 39 27 50 68	84 81 79 72 74 70 84 82 71 73 78	81 70 59 41 88 48 44 67 50 27 48 69	82 81 80 78 79 75 88 83 72 74 79	85 79 72 66 67 52 63 67 49 25 48
North Central	80. 9	79. 1	84.1	77.3	85. 3	73. 3	79. 9	55. 9	78. 5	55. 2	80.7	62.7
Delaware. Maryland. Virginia. Wost Virginia. North Carolina. South Carolina. Georgia. Florida.	82 79 80 81 84 81 82 80	67 64 73 70 83 75 79	84 82 83 85 83 78 82 81	78 72 88 84 85 79 77 78	74 77 80 87 85 79 82 87	81 77 88 82 73 62 49 66	74 74 80 87 88 79 83 90	76 81 90 80 83 71 66 76	78 79 84 88 83 75 77 90	80 83 95 86 89 72 69 80	74 77 79 84 79 71 72 86	71 80 89 86 76 51 52 78
South Atlantic	81.0	74. 5	82.9	82. 4	82. 4	74.4	82. 3	80. 1	82. 4	84.5	78.4	76. 8
Kentucky Tennessee Alabama Mississippi Arkansas Louislana Oklahoma Texas	83 83 84 84 88 84 83 84	82 80 77 80 83 80 78 88	86 86 84 85 87 86 87 87	85 79 79 79 81 83 81 83	88 85 82 85 85 87 87 87	78 60 57 73 78 70 71	83 80 80 80 80 82 80 78	73 72 70 86 83 77 64 72	83 81 76 78 74 79 72 70	84 78 76 85 87 78 58 65	82 78 70 73 74 77 75 74	79 61 51 60 60 63 48
South Central	83. 5	83, 5	86. 5	81.9	86. 0	70. 1	79. 3	72.2	74. 1	70.3	75, 2	57. 2
Montana Idaho Wyoming Colorado. New Mexico Arizona. Utah Nevada. Washington Oregon California	86 87 85 73	60 81 80 86 94 88 80 82 85 87 58	88 92 96 89 82 82 92 90 88 93	47 79 77 84 93 86 75 75 85 82 59	91 89 98 80 78 79 87 88 85 90	43 75 74 76 80 85 58 57 84 82 58	84 84 93 84 75 80 84 86 74 84 79	34 60 54 61 75 80 45 53 80 70	80 81 91 86 81 85 83 84 70 78	41 58 63 54 83 90 48 50 65 63	79 80 90 82 70 84 82 84 74 78	44 62 60 53 81 87 44 51
Western	83. 5	74. 2	87.1	70.8	86. 4	65.8	82, 2	56. 6	81.0	56.8	79.8	57.4
		78.8	85.0	78. 5	85. 3	78.0	80.6	63.7	78.6	63.0	79.3	63, 8

Bureau of Agricultural Economics. Estimates of the ccop-reporting board.

 $<sup>^{\</sup>rm 1}$  For range States, conditions given as reported. Probably relates largely to farm pasture; i. e., range not included.

Table 291 .- Hops: Acreage, production, December 1 price, imports, exports, and consumption in the United States, 1922-23 to 1931-32

Year beginning July	Acreage	Average yield per acre	Produc- tion	Price per pound received by pro- ducers Dec. 1	Imports <sup>1</sup>	Domes- tic exports 1	Net exports 1	Con- sumption by brewers ?
1922-23 1923-24 1924-25 1925-26 1926-27 1926-27 1927-28 1928-29 1929-30 1930-31 1931-32 4	Acres 23, 400 18, 440 20, 350 20, 350 24, 600 24, 400 19, 500 21, 400	Pounds 1, 186 1, 071 1, 360 1, 404 1, 516 1, 246 1, 257 1, 360 1, 202 1, 208	1,000 pounds 27,744 19,751 27,870 28,573 31,522 30,688 32,944 33,195 23,447 25,852	Cents 8, 6 18, 8 10, 3 21, 8 23, 1 22, 9 19, 3 11, 4 14, 8 13, 8	1,000 pounds 1,295 761 439 581 470 753 649 926 1,026	1,000 pounds 13,497 20,461 16,122 14,908 13,369 11,812 8,836 6,793 5,593	1,000 pounds 12,401 19,832 15,737 14,592 12,936 11,087 8,198 5,901 4,583	1,000 pounds 4,556 3,813 2,256 3,420 3,071 2,735 2,627 2,197

Bureau of Agricultural Economics. Compiled from reports of the Division of Crop and Livestock Estimates, Bureau of Foreign and Domestic Commerce, records of the Bureau of Internal Revenue, 1922-23 to 1925-26; annual reports of the Commissioner of Prohibition, 1928-27 to 1929-30; and Commissioner of Industrial Alcohol, 1930-31.

Table 292.—Hops: Acreage, yield per acre, and production in specified countries, 1929-30 to 1931-32

•		Acreage		Yi	eld per a	cre		roductio	n
Country	1929-30	1930-31	1931-321	1929-30	1930-31	1931-32	1929-30	1930-31	1931-321
North America: Canada <sup>1</sup> United States <sup>3</sup> Europe: England and Wales Belgium France Germany Austria Czechoslovakia Hungary Yugoslavia Rumania Poland	Acres 1, 165 24, 400 23, 986 8, 155 10, 509 37, 619 41, 330 41, 330 12, 629 6, 264	Acres 948 19, 500 419, 997 2, 545 8, 169 32, 306 38, 449 7, 139 175 5, 671	Acres 21, 400 419, 536 3, 000 25, 387 30, 000	Pounds 1, 240 1, 360 1, 677 1, 385 1, 311 799 360 630 504 797 462 613	Pounds 1, 230 1, 202 5 1, 718 1, 163 794 754 365 843 537 543	Pounds 1, 208 5 1, 055 757 404 824	1,000 pounds 1,445 33,195 40,219 4,370 13,776 30,074 263,053 26,053 10,065 122 3,842	1,000 pounds 1,166 23,447 28,336 2,961 0,487 24,366 62 32,431 308 3,873	1,003 pounds 25,852 18,928 2,271 6 12,544 24,725 6 3,024
Total European countries reporting all years  Oceania: Australia	108, 090 1, 398 598	93, 297	77, 923	1, 674 1, 410			114, 623 2, 340 843	95, 274	65, 412
Total countries report- ing all years Estimated world total, excluding Russia ?	130, 490 164, 624	112, 797 138, 000	99, 323				147, 818 166, 932	118, 721 130, 000	91, 264

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture except as otherwise stated. Agreage and production figures are for the harvesting season 1929 to 1931 in the Northern Hemisphere and 1929-30 to 1931-32 in the Southern Hemisphere.

Compiled from Monthly Summary of Foreign Commerce of the United States, June issues, 1922–1928;
 January and June issues, 1927–1931, and official records of the Bureau of Foreign and Domestic Commerce.
 Figures represent hope used to make cereal beverages.
 Not including 87,938 pounds in 1924, 71,508 pounds in 1925, 960 pounds in 1926, and 6,294 pounds in 1927 used in the manufacture of distilled spirits.

Preliminary.

Preliminary.
 British Columbia.
 Principal producing States.
 These figures include the acreage left unpicked, which was estimated at 3,500 acres in 1930 and 1,600 acres. in 1931,

<sup>5</sup> Yield based on acreage picked.

<sup>6</sup> Unofficial estimate.

<sup>7</sup> Exclusive of acreage and production in minor producing countries for which no data are available.

Table 293 .- Hops: International trade, average 1925-1929, annual 1927-1930

					Calenda	ar year	· · · · · · · · · · · · · · · · · · ·			
Country	A ve 1925-	rage -1929	19	27	19	28	19:	29	193	30 1
	E <sub>λ</sub> - ports	Im- ports	Ex- ports	Im- ports	Ex- ports	lm- ports	Ex- ports	Im- ports	Ex- ports	Im- ports
FRINCIPAL EXPORTING COUNTRIES Częchosłovakia. United States Yugoslavia. France. Poland. New Zealand. Russia 3. Australia 3. Australia 3.	12,654 9,427 5,601	612 231 4, 458	14, 119 9, 030 5, 682 3, 843 530	554	7, 985 16, 929 3, 612 4, 699 408 1, 569	1, 644 581 198 4, 338 366	3, 438 5, 708 266 161	374 765	7, 640 5, 966 2, 669 4, 570 204	1,099 167 4,516 475
Total PRINCIPAL IMPORTING COUNTRIES	48, 172	7, 316	51, 507	8, 118	50, 272	7, 285	43, 361	6, 715	56, 112	18, 652
Germany United Kingdom Irish Free State Belgium Austria. ('anada Notherlands. Brazil Switzerland. Sweden Argentina Japan Denmark Italy Union of South Africa. Norway British India	4, 672 0 2, 173 117 387 80 0 0 1 1 8 0 0 121 0	7, 855 5, 997 5, 300 3, 082 2, 574 1, 273 1, 101 1, 097 1, 081 1, 051 908 814 672 530	6,119 0,1,853 622 7099 24 0 0 0 0 0 0 0 0 0	10, 855 5, 174 4, 489 2, 929 1, 556 1, 075 1, 072 1, 287 1, 011 620 709 3464	1, 977 0 1, 433 201 488 50 0 0 0 0 0 10 0 188	3, 08h 2, 397 1, 246 1, 261 1, 189 1, 057 1, 241 1, 002 896 743 496	1,478 0 419 688 296 0 0 0 0 0 1 1 1 0 689 689 689 689 689 689 689 689 689 689	6, 967 5, 624 6, 442 3, 823 1, 672 1, 238 1, 418 1, 114 823 877 442 402 300 198	2,498 0 370 216 24 0 0 0 0 0 2 1 1 5 5 0 8 5 7 8 7 8 7 8 7 8 7 8 8 9 8 9 8 9 9 9 9 9	5, 874 7, 171 8, 074 3, 386 1, 479 913 1, 263 1, 281 1, 224 1, 158 1, 214 550 513
Total	10, 533	45, 553	12, 739	46, 258	7, 439	44, 774	7, 470	42, 798	8, 958	40, 780

Bureau of Agricultural Economics. Official sources except where otherwise noted. Lupulin and hopfenmehl (hop meal) are not included when given separately.

Table 294.—Peanuts: Acreage, yield per acre, production, and December 1 price, United States, 1919-1931

		Peanuts, all		-	Peanuts gr	thered	
Year	Total acreage 1	Yield per acre	Total pro- duction <sup>‡</sup>	Area	Yield per acre	Total quantity gathered	Farm price, Dec. 1 8
1919 1920 1921 1922 1922 1923 1924 1925 1925 1927	1,000 acres 1,830 1,563 1,315 1,786 1,930	Pounds  615. 3 606. 4 669. 1 735. 0 661. 2	1,000 lbs. 1,125,932 1,041,514 879,932 1,312,643 1,312,643 1,276,078	1,000 acres 1, 132 1, 181 1, 214 1, 005 896 1, 187 958 843 1, 142 1, 211	Pounds 691.9 712.5 683.1 630.0 722.9 627.7 729.1 749.5 757.0 706.1	1,000 lbs. 783, 273 841, 474 829, 307 633, 114 647, 762 745, 059 698, 475 631, 825 864, 549 855, 096	Cente 9. 33 5. 26 5. 26 4. 68 6. 76 4. 60 3. 64 4. 54 4. 54
1930 1931 1931	2,001 1,862 2,172	670. 4 632. 0 715. 7	1, 341, 416 1, 176, 700 1, 554, 410	1, 360 1, 133 1, 419	703. 3 659. 4 763. 3	956, 448 747, 085 1, 083, 110	4 3, 6; 4 3, 2; 4 1, 8;

Bureau of Agricultural Economics. Estimates of the crop-reporting board. See 1930 Yearbook, p. 813, for data for earlier years.

<sup>&</sup>lt;sup>1</sup> Preliminary.

Internatial Yearbook of Agriculture Statistics.

<sup>&</sup>lt;sup>1</sup> Including acres planted in corn reduced to equivalent solid acres as well as the acreage grown alone.

<sup>2</sup> Including peanuts grazed or otherwise utilized as well as those gathered.

<sup>3</sup> Farm prices are as of Nov. 15, 1919–1923; Dec. 1, 1924–1931.

<sup>4</sup> Average of State prices weighted by total production

<sup>5</sup> Preliminary.

Table 295.—Peanuts: International trade, average 1925-1929, annual 1928-1930

Bureau of Agricultural Economics. Official sources except where otherwise noted. Include shelled and unshelled, assuming the peanuts to be unshelled unless otherwise stated. When shelled nuts were reported they have been reduced to terms of unshelled at the ratio of 3 pounds unshelled to 2 pounds of shelled.

Table 296.—Peanuts: Estimated average price per pound, in the shell, received by producers, United States, 1922-23 to 1931-32

Crop year	Nov. 15	Dec. 15	Jan. 15	Feb.	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Weight- ed average
1922-23 1923-24 1924-25 1924-26 1926-26 1926-27 1927-28 1928-29 1928-30 1920-30 1930-31 1931-32	5.2 6.8 6.3 5.1 4.6 4.8 4.0 3.8 2.2	5.0 6.2 5.6 4.4 4.7 5.2 5.1 3.8 3.2 2.0	5.9 6.4 5.4 4.9 5.4 5.0 8.7 3.2	6.5 6.7 5.5 4.7 5.4 5.4 5.1 8.5 3.6	6.78 6.99 6.64 5.44 5.15 3.7	7.1 6.7 5.7 5.1 5.5 5.2 3.5 3.9	7.1 6.4 6.2 5.0 5.7 5.0 3.7 4.1	7.8 6.5 6.2 4.7 6.6 5.6 5.1 3.6 8.9	6.9 6.4 5.8 6.4 5.5 4.9 8.7 8.8	6.7 6.6 5.2 5.3 6.4 5.7 3.8 3.6	6.4 6.7 6.0 6.0 4.9 8.1	7.0 6.4 4.9 4.9 4.6 4.4 4.2 2.3	5. 5 6. 5 5. 7 4. 8 5. 9 4. 8 3, 4

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by estimated monthly marketings. For previous data see 1930 or earlier year books.

<sup>&</sup>lt;sup>1</sup> Preliminary. <sup>2</sup> International Yearbook of Agricultural Statistics. <sup>3</sup> 4-year average.

Table 297.—Peanuts: Acreage, yield per acre, production, and December 1 price, by States, 1928-1931

	Peanuts gathered															
State		Acr	reage Yield per acre						Prod	uction		Farm price, Dec. 1				
	1928	1929	1930	1931 1	1928	1929	1930	1931	1928	1929	1930	1931 1	1928	1929	1930	1931
Va N. C S. O Ca Flo Tenn. Ala Miss Ark La Okla Tex	1,000 acres 152 205 10 350 44 18 225 10 12 47 126	230 10 392 58 16 229 14 14 10	acres 138 218 12 833 46 13 195 13 9	266 14 410 55 9 273 20 19	Lbs. 928 1, 050 690 540 575 800 560 600 720 450	650 600 760 550 640 564 540 542	900 700 650 560 550 600 520 475 415 460	1, 080 1, 150 650 660 580 700 600 650 560 600 540	141, 056 215, 250 6, 900 189, 000 25, 300 14, 400 126, 000 8, 640 5, 400 85, 250	7, 350 254, 800 34, 800 12, 160 125, 950 8, 960 7, 896 5, 400 38, 482	196, 200 8, 400 216, 450 7, 150 117, 000 6, 760 4, 275 4, 150 10, 120	31, 900 6, 300 163, 800 13, 000 10, 640 7, 800 14, 580	4.9 4.24 4.2 4.7 3.9 6.4 6.6 4.5	4.0 8.4 3.5 3.3 8.0 6.5 6.5 8.9	3.1 3.3 4.0 3.3 3.3 2.8 6.0 4.5 6.0	3.5 2.2 2.0 1.5 4.0 5.0 2.0
v.s.	1, 211	1,360	1, 133	1, 419	706, 1	703. 3	659. 4	763. 3	855, 096	956, 448	747, 085	1, 083, 110	3 4.44	3 3.63	3 3.25	2 1.88

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

Table 298 .- Peanuts: Monthly average prices of cleaned and shelled peanuts, for prompt shipment, f. o. b. important shipping points, 1930-31

VIRGINIA-NORTH CAROLINA SECTION: VIRGINIA, NORTH CAROLINA, AND TENNESSEE 1

Description	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	lug.	Sept.	Oct.
Cleaned Virginias: Jumbos	Cts. 7% 57% 57% 57% 57% 67% 5	Cts. 834 635 534 7 6	53% 714	Cts. 83.4 63.55.6 73.6 53.4	538	Cts. 81.8 63.8 53.8 53.8 53.8 53.8 53.8	Cts. 8 63/8 53/4 83/8 75/8	Cts. 8 8 5 5 5 7 5 5 7	Cts. 8 614 536 816 714 51	Cts. 75/4 65/4 65/4	Cts. 7844 5546 5544 6546 418	Cts. 07/8 5 4 G1/9 41/4 3
SOUTHEAST SECTION	: 80	UTI	CAR	DLINA	A, GE	ORGI	A, A1	ABA	MA,	AND	FLOR	IDA 2
Shelled: Spanish, No. 1 Spanish, No. 2 Runners, No. 1 Runners, No. 2	584 476 476 434	51.6 41.6 43.4	6 5 5 44	65/6 58/2 63/2	01/2 51/3 03/4 51/4	684 576 656 534	6\$4 6 6½	61/4 51/8	61/4 53/8	594 494	414 856	27/6 28/4 28/4 21/4
SOUTHW	EST S	ECT	ON: '	rexa	s, or	HAL	OMA,	ARK	ANSA	s:		
Shelled: Spanish, No. 1 Spanish, No. 2	61/4 53/8	574 514	634 534	734 634	714 614	734 614	734 676	776 634	8 6¾		8\$4 8}4	814 254

Bureau of Agricultural Economics. Based on returns from cleaners, shellers, and brokers. Crop year extends from November to next October in the Virginia-North Carolina section; farther south it begins

Okla.

Preliminary.
 Average of State prices weighted by total production, which includes peanuts grazed or otherwise utilized as well as those gathered.

<sup>&</sup>lt;sup>1</sup> Important shipping points: Boykins, Franklin, Norfolk, Petersburg, Suffolk, and Zuni, Va.; Ahoskie, Edenton, Elizabethtown, Enfield, Scotland Neck, Tarboro, and Williamston, N. C.
<sup>2</sup> Important shipping points: Albany, Americus, Arlington, Ashburn, Bainbridge, Blakely, Cairo, Camilla, Coleman, Cordele, Dawson, Donalsonville, Fort Gaines, Leary, Pelham, Sheliman, Tifton, and Valdosta, Ga.; Andalusia, Brundidge, Dothan, Elba, Enterprise, Eufaula, Headland, and Troy, Ala.; Greenwood and Marianna, Fla.
<sup>3</sup> Important shipping points: De Leon, Denison, Dublin, and Fort Worth, Tex; Durant and Hugo,

Table 299.—Peanut oil, crude and virgin: Peanuts, crushed, and quantity of oil produced in United States, 1919-20 to 1930-31

		Pean	uts crus	hed 1	Oil produced							
Year boginning October	Octo- ber-De- cember	Janu- ary- March	April- June	July- Sep- tember	Total	Octo- ber-De- cember	Janu- ary- March	April- June	July- Sep- tember	Total		
1919-20 1920-21 1921-22 1922-23 1922-23 1922-24 1924-25 1925-26 1925-27 1927-28 1928-29 1929-30 1930-31 *	1,000 pounds 4, 364 27, 414 40, 338 13, 169 6, 164 17, 668 17, 134 10, 576 21, 810 14, 740 31, 598 22, 744	1,000 pounds 5, 867 27, 962 44, 152 9, 081 4, 678 17, 880 11, 143 24, 168 19, 596 50, 888 23, 940	1,000 pounds 9, 214 32, 923 25, 964 8, 436 5, 471 16, 893 10, 668 6, 321 8, 177 10, 392 25, 606 17, 950	15,770 23,480	1,000 pounds 35, 215 111, 779 115, 157 31, 627 18, 239 68, 335 50, 071 35, 006 60, 816 56, 048 120, 764 60, 630	1,000 pounds 1,395 6,069 11,075 3,256 1,406 3,804 3,827 2,544 5,144 3,569 6,723 5,139	1,000 pounds 1,207 7,287 11,381 1,700 1,122 5,265 4,001 2,446 5,324 4,463 11,192 5,214	1,000 pounds 2,311 8,913 6,771 1,998 1,328 4,091 3,093 1,400 1,920 2,331 6,413 4,061	1,000 pounds 8,498 5,958 1,236 255 438 1,974 1,006 1,626 2,614 2,751 1,134	1,000 pounds 8,411 28,227 30,463 7,209 4,204 15,134 11,927 7,990 14,014 12,977 27,079 15,548		

Bureau of Agricultural Economics. Compiled from reports of the Bureau of the Census on "Animal and vegetable fats and oils."

Table 300.—Peanut oil: International trade, average 1925-1929, annual 1927-1930

					Calend	ar year				
Country	Ave 1925-		19	27	19:	28	19	29	193	01
	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports
PRINCIPAL EXPORTING COUNTRIES  France	70, 538 58, 861 4, 262	8, 040 1, 676	78, 889 52, 507 1, 843	5, 861 1, 756	pounds 76, 820 44, 326 83, 763 9, 976	3, 207 1, 779	41, 369 113, 267 7, 011	. 0	1,000 pounds 75, 860 110, 880 86, 785 4, 703	0 3, 378 2, 438
	4, 046 208, 517						-		0, 964 288, 192	
Netherlands	21, 326 364 0 114 4, 343 0 2, 177 0	37, 167 29, 416 20, 992 13, 388 9, 717 7, 782 7, 275 4, 427 4, 283 4, 163 3, 360 2, 367	5, 608 0 4, 299 0 0 0 81	46, 411 23, 477 4, 811 16, 589 6, 526 7, 124 4, 702 2, 847 6, 485 5, 483 3, 510 1, 976	25, 754 190 0 83 3, 532 0 2, 819 0 0 280	35, 056 35, 105 14, 187 18, 053 10, 081 7, 505 6, 729 4, 749 4, 540 3, 892 3, 903 3, 004	23, 993 2 575 0 108 2, 665 0 1, 959 0 0 1, 516	49, 542 43, 152 31, 037 8, 318 15, 976 7, 745 10, 009 3, 231 4, 123 6, 443 8, 574	6, 895 1, 402 148 2, 310 0 1, 692 0 0 783	49, 820 45, 122 56, 556 1, 211 22, 842 4, 423 9, 353 15, 565 1, 694 3, 714 5, 649
Total	60, 277	205, 086	54, 498	192, 893	67, 523	219, 882	65, 759	251, 789	48, 169	260, 016

Bureau of Agricultural Economics. Official sources except where otherwise noted. Conversions made on the basis of 7.5 pounds to the gallon.

<sup>1</sup> Quantities reported in terms of hulled have been converted to "in the hull" basis by multiplying by 1.5. Preliminary.

Proliminary.
 International Yearbook of Agricultural Statistics.

Table 301.—Peanut oil, refined: Average price per pound, in barrels, New York, 1922-23 to 1931-32

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aug.	Aver- age
1922-23 1923-24 1923-25 1925-26 1925-27 1927-28 1928-29 1929-30 1930-31 1931-32	12. 40 16. 00 16. 45 15. 00 16. 00 14. 50	12. 25 16. 00 16. 25 15. 00 16. 00 14. 50 13. 50 13. 25 13 50	13. 03 15. 59 16. 25 15. 00 15. 50 14. 30 12. 25 13. 25 13. 50	14. 25 14. 80 16. 25 15. 00 14. 62 13. 50 11. 00 13. 25 13. 50	16. 88 14. 75 16. 75 15. 00 14. 50 13. 50 12. 85 13. 50	17. 38 14. 75 16. 75 15. 50 14. 50 13. 50 12. 75	17. 85 14. 75 16. 75 16. 00 14. 50 13. 50 12. 75	17. 75 14. 75 16. 75 16. 00 14. 50 13. 50	16. 56 14. 88 15. 20 16. 00 14. 50 13. 50 13. 25 11. 75	16 00 15.25 15.00 16.00 14.50 13.25 11.75	15. 25 15. 00 16. 00 14. 50	16. 00 15. 56 15. 00 16. 00 14. 50 13. 50 13. 25 11. 75	15. 53 15. 19 16. 03 15 54 14 84 13. 73 13. 10 12. 56

Bureau of Agricultural Economics. Compiled from Oil, Paint, and Drug Reporter, average of weekly range. See 1930 Yearbook, p. 817, Table 334, for data for earlier years.

Table 302.—Peas, dry field: Acreage, yield per acre, and production, by States, 1929, 1930, and 1931

		Acreage		Yi	eld per a	cre	Production			
State	1929	1930	1931 1	1929	1930	1931	1929	193	1931 1	
Michigan Wisconsin	1,000 acres 27 30 25 56 49	1,000 acres 28 30 30 64 49	1,000 acres 29 25 33 55 49	Bushels 13.0 15.5 15.5 20.0 12.0	Bushels 11. 0 14. 5 17. 5 20. 0 12. 0	Bushels 8.5 10.5 13.5 19.0 9.0	1,000 bushels 351 465 388 1,120 588 2,912	1,000 bushels 308 435 525 1,280 588 3,136	1,000 bushels 246 262 446 1,045 441 2,440	

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

Table 303.—Clover seed (red and alsike), sweetclover seed, Lespedcia (Japan clover) seed, and alfalfa seed: Acreage, yield per acre, production, and December 1 price, by States, 1929-1931

CLOVER SEED (RED AND ALSIKE)

State		Acreage		Aven	ago yic acre	ld per	1	Production	1	roc	per b xived cers I	bу
	1929	1930	1931 1	1929	1930	1931	1929	1930	1931 1	1929	1930	1931
N. Y Pa Mich Wish Mich Wish Minn Iowa Mc N. Dak N. Nebr Kans Md Ya Ky Tenn Idaho Wyo Colo Oreg	Acres 9,000 13,000 265,000 203,000 203,000 216,000 112,000 2,000 2,000 2,000 21,000 11,000 21,000 11,000 21,000 21,000 12,000 21,000 11,000 11,000 11,000	8,000 107,000 149,000 125,000 125,000 128,500 96,000 118,000 17,300 5,000 5,000 3,000 34,000 2,500 2,500 17,000	12, 000 160, 000 131, 000 121, 000 81, 000 87, 000 78, 000 1, 000 1, 000 1, 000 1, 000 2, 000 2, 000 2, 000 17, 000	11.225672220664556122305	1.1 2.0 5.1 5.0 5.0 3.1	Bush 1.67 1.102 1.35 1.12 1.102 1.10 1.10 1.10 1.10 1.10 1.1	845, 600 190, 400 298, 800 6, 000 30, 400 17, 600 32, 600 22, 600 23, 100 197, 400 5, 800 15, 000 63, 000	12, 000 107, 000 178, 200 178, 200 193, 900 192, 000 147, 500 75, 600 27, 200 7, 200 1, 500 1, 500 10, 000 112, 500 10, 000 55, 700	Bush. 0, 400 20, 400 224, 000 131, 000 145, 200 100, 400 90, 600 000 1, 500 22, 100 22, 100 24, 500 138, 000 3, 000 9, 000 59, 500	15. 25 10. 20 9. 50 9. 60 10. 50 9. 60 11. 00 9. 60 14. 60 14. 60 13. 70 9. 20 12. 00 11. 55 9. 50	14. 00 15. 00 11. 80 12. 40 11. 40 11. 40 11. 75 11. 75 11. 30 11. 00 11. 40 11. 40 11. 00 11. 00 11. 00 12. 50 11. 50 11	9.70 12.50 7.20 7.20 7.50 8.50 8.50 8.70 10.50 6.00 6.50
U. S	1, 789, 000	1, 076, 000	885, 300	1. 47	1.42	1.38	2, 627, 300	1, 523, 100	1, 222, 100	10. 28	11. 78	7. 15

<sup>1</sup> Preliminary.

<sup>&</sup>lt;sup>1</sup> Preliminary.

<sup>&</sup>lt;sup>2</sup> Less than 1,000 acres.

Table 303.—Clover seed (red and alsike), sweetclover seed, Lespedeza (Japan clover) seed, and alfalfa seed: Acreage, yield per acre, production, and December 1 price, by States, 1929-1931—Continued

## SWEETCLOVER SEED

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

Table 304.—Clover seed: Receipts, Chicago, 1922-23 to 1931-

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Total
1922-23 1923-24 1924-25 1924-26 1928-27 1927-28 1928-29 1929-30 1930-31 1931-32	1,000 lbs. 1,358 641 346 393 1,107 576 958 1,225 985 1,150	1, 681 888 946 3, 596 2, 285 3, 125 1, 883 1, 513	2, 133 4, 689 2, 751 2, 121 1, 782	1, 039 1, 801 2, 603 1, 350 1, 544 1, 746 1, 269 705	1, 500 1, 500 1, 984 1, 695 1, 557 790 758 1, 224	1, 641 1, 507 2, 079 1, 857 1, 522 1, 431 1, 204	1, 574 2, 888 1, 671 1, 313 1, 616 1, 588	1, 352 765 849 546 848 959 1, 112	259 9 487 55 268 68 232	41 27 28 40 110	160	56 360	10, 555 11, 008

Bureau of Agricultural Economics. Compiled from annual reports of the Chicago Board of Trade.

<sup>&</sup>lt;sup>1</sup> Preliminary.

Table 305.—Alfalfa seed: Estimated average price per bushel received by producers, United States, 1922-23 to 1931-32

Crop year	Aug. 15	Sept.	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	Мау 15	June 15	July 15	Weight- ed aver- age 1
1922-23 1923-24 1924-25 1925-26 1925-27 1927-28 1928-20 1929-30 1930-31 1931-32	Dolls. 7, 74 10, 38 10, 99 9, 88 9, 37 9, 62 10, 38 13, 52 11, 91 9, 69	8. 00 9. 20 10. 74 10. 51 9. 17 9. 69 10. 25 12. 85 11. 36	7. 94 10. 75 10. 39 10. 30 8. 94 9. 78 10. 71 11. 68 10. 68	8. 50 10. 21 10. 16 10. 65 9. 42 9. 45 11. 96 10. 83 10. 18	9. 45 10. 19 10. 33 9. 87 9. 48 9. 76 12. 69 11. 10 9. 86	9. 58 10. 43 10. 52 9. 51 10. 12 9. 55 12. 67 11. 15 9. 97	9. 96 10. 51 11. 05 9. 48 10. 33 9. 74 13. 19 11. 16	10. 56 11. 17 11. 72 9. 82 10. 50 10. 11 13. 84 11. 97	12. 73 9. 94 11. 04 10. 35 14. 19 11. 97	10. 59 11. 67 12. 00 9. 92 10. 63 10. 52 14. 69 12. 38	10. 57 11. 39 10. 99 10. 22 10. 62 10. 91 14. 91 12. 05	10. 25 11. 33 11. 41 9. 79 10. 17 10. 24 14. 68 12. 10	9. 36 10. 63 10. 62 9. 99 9. 45 9. 87 11. 37 11. 65

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by monthly marketings.

Table 306.—Clover seed, red: Estimated average price per bushel received by producers, United States, 1922-23 to 1931-32

Crop year	Sept.	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	Мау 15	June 15	July 15	Aug. 15	Weight- ed aver- age
1922-23 1923-24 1924-25 1926-26 1926-28 1926-28 1927-28 1928-29 1928-30 1930-31 1931-32	Dolls. 8.85 11.07 12.15 13.42 16.63 16.78 16.26 12.48 11.65 7.99	9. 66 12. 20 12. 80 14. 42 17. 21 15. 67 16. 49 10. 68 12. 47	10, 18 12, 18 13, 42 14, 85 17, 85 15, 07 16, 68 9, 75 12, 35	15. 31 15. 48 17. 89 15. 33 16. 81 9. 94 11. 76	11. 16 12. 51 16. 17 16. 04 19. 07 15. 97 16. 96 9. 92 11. 78	11. 52 12. 67 16. 95 16. 83 20. 18 16. 37 17. 37 9. 95	11.71 13.04 .18.19 17.45 21.16 16.90 17.54	11. 48 13. 00 17. 40 17. 88 22. 75 16. 92 17. 96 10. 23	11. 20 13. 07 16. 82 18. 08 22. 45 17. 04 17. 90 10. 23	10. 84 12. 72 15. 48 17. 16 22. 07 16. 89 17. 62 10. 40	10. 94 12. 42 15. 67 17. 17 20. 60 16. 42 17. 17 10. 34	10. 46 12. 09 14. 86 16. 83 17. 94 15. 90 16. 30 11. 01	10. 71 12. 38 15. 35 15. 87 10. 06 16. 11 16. 99 10. 34

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly prices obtained by weighting monthly prices by average monthly marketings. For previous data see 1930 or earlier Yearbooks.

Table 307.—Timothy seed: Acreage, yield per acre, production, and December 1 price, by States, 1929-1931

State		A creage			rago y per acr			Production	מכ	Price per bushel received by pro- ducers Dec. 1		
	1929	1930	1931 1	1929	1930	1931	1929	1930	1931 1	1929	1930	1931
PaOhioIndIndIndIndIndIowbMoN. DakN. DakS. Dak	Acres 5, 000 29, 000 9, 000 54, 000 10, 000 40, 000 172, 000 80, 000 2, 900 4, 800	2, 500	Acres 4,000 26,000 15,000 71,000 19,000 44,900 217,000 80,000 2,500 3,400	333022690 333343290	Bush. 2.6 3.2 2.2 9 8.8 4.2 0 2.8 8 3.0 6	Bush. 3.1 2 3.5 5 8.4 3.5 5 4.4 0 3 2 3	Bush. 12, 500 101, 500 28, 800 162, 000 32, 000 168, 000 610, 200 232, 000 8, 700 13, 000	41, 600 8, 800 171, 100 68, 400 184, 800 1, 032, 000 201, 600 7, 500	52, 500 241, 400 66, 500 157, 200 1, 041, 600 352, 000 5, 000	2. 25 2. 25 2. 20 2. 45 2. 20 2. 20 2. 20 2. 20	3. 70 3. 20 3. 10 3. 10 2. 80 2. 80 2. 50 2. 40	2.80 1.60 2.00 1.70 1.70 1.60 1.60 1.90
v. s	406, 700	428, 200	482, 800	3. 39	4.06	4. 24	1, 377, 700	1, 740, 000	2, 045, 600	2. 22	2, 82	1.61

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>&</sup>lt;sup>1</sup> Straight crop year average until 1924. For previous data see 1930 or earlier Yearbooks.

<sup>&</sup>lt;sup>1</sup> Preliminary

Table 308 .- Timothy seed: Receipts, Chicago, 1922-23 to 1931-32

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Total
1922-23 1923-24 1924-25 1925-26 1925-27 1927-28 1922-29 1929-30 1930-31 1931-32	3,698 5,933 5,907 6,548 1,652 3,519 7,079	13, 397 12, 714 7, 599 7, 981 7, 387 5, 664 3, 363	4, 419 4, 845 5, 009 3, 368 3, 741 3, 164 2, 026 3, 451	1,606 3,736 2,047 2,113 3,812 956 1,915 1,701	1, 329 1, 552 1, 651 1, 158 961 921	662 2, 138 2, 499	2, 038 1, 801 1, 780 1, 669	1,000 lbs. 1,697 1,815 2,566 2,316 2,601 1,826 802 1,229 1,184	1, 162 1, 809 1, 734 1, 481 1, 625 471 926	1, 240 1, 015 980 1, 613	815 664 667 779 1,039 311 109	507 687 672 516	31, 961 37, 687 32, 943 30, 252 32, 287 15, 849

Bureau of Agricultural Economics. Compiled from annual reports of the Chicago Board of Trade.

Table 309.—Timothy seed: Estimated average price per bushel received by producers, United States, 1922-23 to 1931-32

Crop year	Aug. 15	Sept.	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Weight- ed aver- age
1922-23 1923-24 1924-25 1925-26 1926-27 1927-28 1928-20 1929-30 1929-30 1930-31 1931-32	Dolls. 2 20 2 63 3. 20 3 36 2 68 2 06 1. 86 1. 89 2 51 1. 38	Dolls. 2 28 3.01 3.12 3.21 2.55 1.66 1.91 1.88 2.62 1.43	Dolls. 2 48 3.12 8.16 3.21 2.61 1.58 2.08 2.02 3.06 1.44	Dolls. 2.49 3.15 2.88 3.31 2.46 1.61 2.20 2.17 3.11 1.46	Dolls. 2.69 8.19 3.03 3.41 2.58 1.78 2.25 3.09 1.54	Dolls. 3.06 8.37 3.04 3.38 2.62 1.78 2.41 2.48 3.29	Dolls. 2 98 3.58 3.03 3.56 2 70 1.92 2.49 2.37 3.82	Dolls. 3.00 3.60 3.15 3.51 2.69 1.86 2.62 2.51 3.58	Dolls. 2 99 3. 54 3. 24 72 76 1. 88 2. 67 2. 67 3. 61	Dolls. 2. 87 3. 48 3. 10 3. 26 2. 69 1. 96 2. 65 2. 69 3. 43	Dolls. 2 92 3.44 3.05 8.41 2.76 2.08 2.56 2.65 3.16	Dolls. 3. 16 3. 23 3. 47 3. 36 2. 58 2. 07 2. 36 2. 53 2. 33	Dolls. 2, 60 3, 19 3, 11 3, 33 2, 61 1, 77 2, 20 3, 02

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly prices obtained by weighting monthly prices by average monthly marketings. For previous data see 1930 or earlier Yearbooks.

Table 310.—Seeds: Average price per 100 pounds, specified markets, 1922-1931

Sea- son, Jan- uary- May	Alfalfa, Kansas City	Alsike clover, Chi- cago	Red clover, Chi- cago	Ken- tucky blue- grass, Kansas City	Tim- othy, Chi- cago	Sweet- clover, Minne- apolis	fescue,	Lespe- deza, Louis- ville	German millet, Kansas City	Amber sorgo, Kansas City	Hairy vetch, Balti- more	Sudan grass, Kansas City
1922 1923 1924 1925 1926 1927 1928 1929 1930 1931	Dolls. 17. 96 20. 03 22. 26 22. 84 20. 40 19. 90 21. 90 26. 04 24. 81 22. 56	Dolls. 18. 21 16. 46 15. 66 23. 38 27. 55 37. 42 27. 80 34. 65 19. 90 23. 88	Dolls. 23. 50 20. 93 20. 87 33. 97 42. 54 30. 65 33. 63 21. 35 25. 04	Dolls. 53. 50 25. 88 25. 09 28. 00 38. 05 20. 53 19. 72 31. 31 20. 00 34. 37	Dolls. 6, 99 7, 02 7, 96 6, 79 7, 94 5, 97 4, 74 6, 54 8, 06 10, 55	Dolls. 8.53 12.41 15.28 12.34 9.65 13.65 8.55 8.50 9.22	Dolls. 15. 90 10. 00 10. 58 9. 42 15. 49 25. 00 14. 70 16. 01 10. 00	Dolls. 17. 11 18. 98 20. 78 19. 50 15. 74 8. 57 17. 65 20. 43 14. 37 14. 69	Dolls. 2.03 3.76 3.80 4.98 3.10 3.25 2.45 3.44 3.45 3.69	Dolls. 1. 04 4. 25 1. 74 2. 24 2. 72 3. 10 1. 90 2. 09 3. 47 2. 81	Dolls. 12. 23 16. 81 10. 45 8. 82 12. 25 15. 10 9. 72 9. 30 9. 00 8. 45	Dolls. 4. 29 14. 28 8. 22 5. 68 4. 31 6. 68 3. 62 5. 80 5. 40 7. 38

Bureau of Agricultural Economics. Compiled from weekly reports to the bureau from seedsmen in the various markets. These prices are the average whoelsale selling prices for high-quality seed.

Table 311.—Field seeds: Average wholesale price per 100 pounds at specified markets, by months, 1922-1931

Season.	Λl	falfa, cor	amon, K	ansas C	ity		Alsike	clover, (	Chicago	
January-May	Jan.	Feb.	Mar.	Apr.	May	Jan.	Feb.	Mar.	Apr.	Мау
1922 1923 1924 1925 1925 1927 1927 1928 1929 1930	19.50 21.50	Dollars 18.00 19.50 21.50 22.10 20.00 20.00 22.00 24.75 22.50	Dollars 18. 50 19. 50 22. 30 23. 10 20. 00 20. 00 22. 00 26. 20 25. 25 22. 50	Dollars 17. 90 20. 65 23. 00 23. 50 21. 00 20. 00 22. 00 26. 00 25. 25 22. 50	Dollars 18. 50 21. 00 23. 50 21. 00 20. 00 22. 00 26. 00 25. 25 22. 50	Dollars 18. 20 16. 50 15. 55 21. 75 26. 10 36. 00 28. 35 34. 65 20. 10 23. 70	Dollars 19. 25 16. 50 15. 45 22. 35 27. 25 37. 95 28. 10 33. 90 19. 90 24. 00	Dollars 19.00 16.50 15.45 23.05 27.85 39.45 27.80 35.15 19.50 23.75	Dollars 17. 30 16. 45 15. 85 24. 75 28. 20 38. 85 27. 70 35. 45 20. 10 23. 20	Dollars 17. 30 16. 35 16. 00 25. 00 28. 40 34. 27. 10 34. 15 19. 90 22. 75
		Red c	lover, C	hicago		8	weet cl	over, Mi	inneapol	s
1922 1923 1924 1924 1925 1926 1927 1928 1929 1930	22. 20 22. 55 23. 10 34. 20 32. 15 38. 60 32. 50 33. 00 21. 20 26. 00	24. 55 22. 45 21. 55 36. 00 36. 50 42. 30 30. 95 33. 20 21. 35 26. 05	25. 45 20. 60 21. 10 34. 30 34. 70 45. 00 29. 95 34. 40 21. 00 25. 45	23. 35 19. 70 19. 60 33. 35 34. 00 44. 25 30. 20 34. 35 21. 60 24. 15	21. 95 19. 35 19. 00 32. 00 34. 00 42. 55 29. 70 33. 20 21. 60 23. 55	8. 00 12. 40 15. 00 13. 00 9. 00 14. 35 8. 75 8. 50 9. 50	8. 25 12. 00 15. 00 18. 00 9. 45 14. 35 8. 70 8. 50 9. 40	8. 50 12. 40 15. 40 12. 75 9. 85 14. 00 8. 45 8. 50 9. 15	8. 90 13. 00 15. 90 11. 95 9. 95 13. 10 8. 45 8. 50 8. 00 9. 05	9. 00 12. 25 15. 10 11. 00 12. 50 8. 40 8. 50 9. 00
	Kent	ucky blu	iegrass, l	Consos C	ity		Timo	thy, Chi	cago	
1922 1923 1924 1925 1026 1927 1928 1929 1930	50.00 25.10 25.10 28.00 40.00 20.25 19.50 31.50 20.00 34.10	52. 50 25. 35 28. 00 39. 25 21. 00 19. 50 30. 75 20. 00 34. 25	55.00 25.00 28.00 28.00 37.00 21.00 19.60 31.30 20.00 34.50	55. 00 26. 90 25. 00 28. 00 37. 00 20. 40 20. 00 31. 50 20. 00 34. 50	55.00 27.50 25.00 28.00 37.00 20.00 31.50 20.00 34.50	7. 05 7. 00 8. 15 6. 95 8. 10 6. 05 4. 75 6. 75 7. 10 10. 20	7. 30 7. 00 8. 25 6. 70 8. 10 6. 05 4. 55 6. 70 7. 20 10. 45	7. 30 7. 05 8. 10 6. 50 7. 95 5. 85 4. 35 6. 62 7. 30 10. 45	6.60 7.75 6.85 7.80 5.95 4.75 6.45 8.25	6. 70 7. 00 7. 55 6. 95 7. 75 5. 95 5. 30 6. 15 10. 45

Bureau of Agricultural Economics. Compiled from weekly reports to the bureau from seedsmen in the various markets. These prices are the average wholesale selling price for high-quality seed.

Table 312.—Forage plant seed: Imports into United States, 1921-22 to 1930-31 1

				Ye	ar begii	nning J	uly			
Kind of seed	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27	1927–28	1928-29	1929-30	1930-3
Alfalía	7, 057 3, 443 10, 391 16, 623 57 43 1 1, 496 2, 922 4, 763 1, 868 828 95	5, 506 2, 262	1,000 lbs. 12,818 817 11,566 7,745 24,729 1,408 4,039 2222 74 (3) 595 1603 6,600 1,952 1,034 1,034 3,215	1,000 (bs. 4,783 1,150 10,425 4,834 6,541 1,227 3,493 (e) 1 253 243 992 4,345 1,385 1,385 1,266	1,000 lbs. 4,548 111 10,5786 10,786 11,626 6,879 6,879 122 122 125 456 1253 6,526 2,302 1,633 3,986	1,000 lbs. 5,134 4,163 2,385 10,816 9,130 174 24 16 (8) 2,788 1,203 833 831 2,124 992	7,000 lbs. 78.2 1,102 7,009 1,346 4,641 1,778 3,379 116 41 (1) 30 (2) 30 1,73 6,438 1,083 4,563 4,563 4,563 5,563 8,995	1,000 lbs. 1,146 1,228 4,798 3,395 7,547 2,410 1,464 29 250 5 8 (1) 82,377 6,982 1,180 (2) 4,084 1	7,000 lbs. 337 608 4 7,220 3,099 2,154 2,278 206 8 32 51 (4) 318 6,681 937 2444 87 2,483 821	1,000 lbs. 23. 98. 99. 3,076. 1. (5) 344. 5,111. 822. 200. 1,622. 7,602.

Bureau of Agricultural Economics. Compiled from data of the seed laboratory, Bureau of Plant Industry.

<sup>&</sup>lt;sup>1</sup>Imports of hairy vetch and sweetclover for all years are based on information furnished by U. S. Customs Service. All other figures represent imports of seed permitted entry under the Federal seed act (formerly designated the seed importation act.)

<sup>2</sup> Loss than 500 pounds.

<sup>3</sup> Data not compiled.

# STATISTICS OF BEEF CATTLE, HOGS, SHEEP, HORSES, MULES, AND ASSES

Table 313 .- All cattle and other cattle: Number on farms and value per head in the United States, 1840, 1850, 1860, 1867-1932

	Ca	attle on far	ms		Cattle on farms				
Yesr	All		an milk ws	Year	All		an milk ws		
	cattle 1	Number 2	Value per head Jan. 13		cattle 1	Number 3	Value per head Jan. 14		
1840 <sup>5</sup>	Thou-sends 14, 978 15, 565 565 500 500 500 500 500 500 500 500	Thou-sands	Dollars  15.79 15.87 20.78 18.12 18.06 17.55 16.91 16.91 16.72 15.38  16.10 17.33 19.89 21.81 23.25 21.77 19.79 17.79 17.05	1900 6	Thou- stands 43, 902 67, 720 57, 720 57, 720 50, 544 62, 213 62, 373 64, 037 65, 634 61, 895 65, 833 61, 895 66, 394 67, 895 68, 394 69, 533 61, 229 70, 251 88, 737 70, 251 88, 663 67, 384 68, 583 67, 384 68, 585 67, 385 68, 683 67, 384 68, 683 67, 384 68, 683 67, 384 68, 683 67, 384 68, 683 67, 385 68, 683 69, 780 68, 917 67, 520 68, 917 68, 917 68, 917 68, 917 69, 918 68, 917 68, 917 69, 918	Thou- seruds 27, 610 50, 554 42, 265 45, 023 46, 023 47, 715 47, 678 47, 783 47, 184 47, 787 41, 480 31, 784 31, 784 31, 784 31, 784 31, 387 31, 387 38, 006 48, 992 48, 891 48, 871 48, 841 48, 871 48, 841 48, 871 37, 868 38, 872 38, 083 48, 873 38, 083 48, 873 38, 083 38, 882 38, 882 38, 882	Dollars  23. 66 18. 83 17. 74 16. 52 14. 98 16. 55 19. 41 20. 60 24. 91 29. 62 31. 54 31. 67 32. 61 33. 91 33. 91 34. 41 35. 42 36. 33 42 38. 33 42 38. 33 42 38. 38		

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revisions for the year 1920-1931 were made January, 1932.

<sup>1</sup> Prior to 1900 estimates for each 10-year period represent an index of annual changes applied to census as base on first report after census data were available. Figures for 1900-1919 are tentative revised estimates of the Bureau of Agricultural Economics as first published in 1927 yearbook.

2 Obtained by subtracting the estimates of 'milk cows on farms' shown in Table 386 from the estimates of 'milk cows on farms' shown in Table 386 from the estimates of 'milk cows on farms' shown in Table 386 from the estimates of 'all cattle on farms' shown in this table.

3 Series for 1867-1899 are estimates as currently reported.

4 Data for 1900-1925 are an old series adjusted on basis average relationship between the old and new series from 1926 to 1922. Old series was weighted averages of prices by age groups only and was shown in 1928 Yearbook. The conversion factor was 0.9466 (base is old series). Data for 1923-1932 are a new series referred to above, of average values by age and sex classification weighted by numbers in each class.

3 Italic figures for Census years represent classification of cattle as follows: 1840reported as "neat cattle," 1880 and 1890 exclude an estimated number of unenumerated cattle on ranges as follows: 1880, 3,750,022; 1890, 6,286,220. No estimate made prior to 1880. Figures for census prior to 1900 were nominally exclusive of calves, though some calves may have been included. 1900, 1910, and 1920 includes pring born calves. 1850-1890 exclude working oxen as follows: 1850, 1,700,744; 1880, 2,254,911; 1870, 1,319,371; 1890, 993,841; 1890, 1,311,494. Not separately reported after 1890. Census dates were June 1, from 1840 to 1900; Apr. 15, 1910; Jan. 1, 1920 and 1922; Apr. 1, 1930.

4 Ortginal estimate of the Bureau of Agricultural Economics.

Table 314.—All cattle and calves, including cows and heifers kept for milk: Estimated number on farms and value per head, by States, January 1, 1928-1932

		1	Number			Value per head <sup>1</sup>				
State and division	1928 3	1929 3	1930 2	1931 2	1932 8	1928	1929	1930	1931	1932
Maine	Thou- sands 225	Thou- sands 225	Thou- sands 232	Thou- sands 241	Thou- sands 243	Dol- lars 57.90	Dol- lars 65, 40	Dol- lars	Dol- lars 51. 20	Dol- lars 37. 20
Maine New Hampshire	116	116	120	127	131	79.30	65. 40 86. 70	71. 70 89. 70	67. 90	45.00
	404 179	409	415	427	436	76. 70	77. 30	78. 70	61.30	41.00
Vermont Massachusetts Rhode Island Connecticut New York New York Pennsylvania	27	181 28	183 20	181 29	179 <b>2</b> 9	102.80 109.30	106. 10 114. 50		98.80	70. 30 71. 20
Connecticut	140	142	147	153	155	109, 90	111. 20	113, 70	88. 10	67. 30
New York	1,851	1,904	1,956 160	1, 956	1,976	90.60	100. 10	95. 40	69. 20	49.70
Pennsylvenie	155 1, 277	157 1, 330	160 1,385	160 1, 357	163 1,398	102. 40 77. 10	113. 80 86. 70	128. 30 86. 20	104. 00 63. 50	73. 50 47. 20
	1, 211	1, 330	1,380	1, 307			80.70	80. 20	03. 80	47. 20
North Atlantic	4, 374	4, 492	4, 627	4, 631	4,710		93. 13	92, 38	68. 96	49, 70
Ohio Indiana	1,495	1, 525	1,610	1, 502	1,610	65. 10	72.00	71.90	46. 80	
Illinois	1, 287 2, 053	1,307 2,094 1,335	1,333 2,199 1,391	1, 360	1, 428 2, 401 1, 390	59. 00 59. 30	67. 00 68. 70	66. 00 67. 60	42. 50 48. 30	30. 40 31. 70
Michigan	1,318	1.335	1,391	2, 265 1, 376	1, 390	66. 50	76.00	75. 10	47.70	34.80
Illinois	2, 920	2, 913	3,056	3, 150	3, 184	69. 90	79. 10		51.80	34.60
North Central, East		9, 174	9, 589	9, 713	10, 013		73. 37	72. 62	48. 30	
Minnesota	2. 750	2,872	3 030	3, 151	3 246	54. 50	63, 30	60.80	41, 70	25, 60
Missouri North Dakota South Dakota Nebraska	3, 758	3,858	3, 030 3, 983 2, 500 1, 307	4, 063	3, 246 4, 185	54.30	61.90	61.30	42.40	26, 60
Missouri	2, 250	2, 350	2,500	2, 551 1, 398	1 2 RRA	47 RN	57.80	53.50	34, 70	23, 80
North Dakota	1, 140	1, 195	1,307	1,398	1, 454	43.60	53. 50	51.30	34. 90	22, 60
Nebraska	2 706	1,758		1.040	1,907	47.80 49.40	55. 40 50. 00	54. 80 55, 00	37. 30 39. 00	21.90 24.20
Kansas	2, 750 3, 758 2, 250 1, 140 1, 718 2, 766 2, 670	2, 931 2, 854	3, 016 2, 991	3, 167 3, 141	3, 104 3, 392	44. 20			33. 40	22.00
North Central, West	17, 052	17, 818		19, 417	19, 948				38. 20	
North Central		26, 992	29, 297	29, 130	20, 961	54. 90	63, 48	61. 65	41. 57	27. 24
Dalamen		50	50	49	49	77.00	93, 70	89.00	65. 30	46, 20
Maryland Virginia West Virginia North Carolina South Carolina	266	273	277	277	277	69, 90	79. 50	80.70	61. 10	41.20
Virginia	723	752	777	754	782 525	47.10	54.90	54.80	33.90	27.80
West Virginia	455	478		500	525	52.00	60.30	58. 10	36.00	28, 60
South Carolina	496	496 268	507 201	532 261	548 266	44.70	48. 10 39. 30	47. 80	35.90	27.10
Georgia	285 709	736	758	773	789	34. 10 27. 00	31.00	39.70	33. 10	23.60 16.60
Florida.	488	444	432	432	441		23.40	31.60 29.70	23, 90 23, 70	18.00
South Atlantic	3, 531	3, 497	3, 572	3, 578	3, 677	40.03			33. 57	
Kentucky	990	1,015	990	940	978	46, 90	51.40	49.40	91 00	92 70
Kentucky Tennessee	957	971	992		1.032	38.80	43.60	44.40	81.80	23, 70 20, 50
Alabama	756	756	756	771	810	38.80 27.80	43. 60 32. 20	33. 10	22.40	15.80
Alabama, Mississippi Arkansas Louisiana Oklahoma	879	863			960	25.80	30.10	32, 40	20.30	14.30
Louisiana	737 055	728 684	743 684				34. 10	33. 90	19, 20 22, 70	16. 20
Oklahoma	1,729	1,814	1,915	2.010	2 151	23.70 39.70	31.90 45.00		25.40	18. 20 18. 70
Texas	5, 950	6, 152	6, 252	2,010 6,127	2, 151 6, 127	37.30	41.70	87. 50	23. 90	17. 30
South Central	12, 653	12,983	13, 234		<u> </u>	-	40.79	38. 27	·	
Montana	1, 141	1,100	1, 226	1, 268	1, 250	46.00	58.10	53. 80	20 00	94 10
		אאם ו	a escues	636	1, 200	48.60	56.70	52.10	38.80 40.70	24.10 24.60
Wyoming	771	778	790	830	863	48.90	59.10	54.30	40.30	24. 50
New Maries	1,377	1,421	1,454	1,541	1,541	46, 70	55.30	50.90	87.80	1 22.50
Idado Wyoming Colorado New Mexico Arizona Utah Nevada Washington Oregon California	1, 156 835	1,073 715	1,100 750	1,100 795	1, 144 851	40.90	46.50 49.50	40.30 48.00	30, 30 33, 20	21.30 22.30
Utah	475	475	461	475	484	45.60	57.50	52.70	40.30	22.70
Nevada	375	345	320	320	310	46.40	59, 90	52, 40	88.70	25. 70
Oregon	530 702	557	579	591	614	58.20	72.40	65.80	88. 70 47. 90	1 37. OC
California	2,070	723 2,049	757 1,967	772 2,006	1,886	49.50 53.70	59.90 64.50		40.70 51.50	29. 80 33. 90
Western	10, 023	9, 914				-	-		-	<del> </del>
United States	00,701	57, 878	59, 730	00,915	62, 407	50.81	58.77	56.00	39.81	26.64

Bureau of Agricultural Economics. Estimates of crop-reporting board. Revisions by States, 1920–1927, are published in February, 1982, Crops and Markets.

<sup>1</sup> Sum of total value of subgroups (classified by age and sex) divided by total number and rounded to nearest dime for States. Division and United States averages not rounded. State figures are new weighted value series not comparable to State figures previously published for the years prior to 1925.

3 Revisod, January, 1932.
3 Preliminary.

Table 315.—Cattle: Number in countries having 150,000 or over, average 1921-1925, annual 1926-1931

Country	Month of estimate	Average 1921- 1925 1	1926	1927	1928	1929	1930	1981
North America and West		Thou-	Thou-	Thou-	Thou-	Thou-	Thou-	Thou-
Indies:		anm da	nam da	sands	sands	sands	sands	sands
United States	January	66, 725 9, 588	59, 977	57, 528	56, 701 8, 793	57, 878 8, 825	59, 730 8, 937	60, 915
Canada	June	9,588	8, 571 5, 585	9, 172	8, 793	8, 820	0, 837	
Mexico	do July	2, 492 268	564	310	298	396	416	
Guatemala Honduras	July	1 466	001					
Salvador							4 328	
Nicaragua		* 1, 200						
Nicaragua Costa Rica		435	423	478	443	399		
Cuba	December 6	4, 841 640	3, 783	4, 704	4, 729 488	4, 421	4, 845	4, 377
Dominican Republic Porto Rico	May	279			141			
F0140 IN100								
Estimated total 7		87, 900						
South America:								
Colombia		7, 468	6, 500	6, 727			7, 343	
Venezuela British Guiana Ecuador		2,689					7, 343 5 3, 000	
British Guiana		117	138	141	154	154	154	
Ecuador		5 1, 500	1, 280			<sup>5</sup> 1, 285	41,806	
Politrio	February	1, 198 2, 145	2, 320	1, 404		1,855		
Chile		1.957	2,020	1, 707		2,000	4 2, 388	
Brazil 8	September	1 69 24 271					4 2, 388 40, 000 4 7, 128	
Uruguay.		4 8, 432					47,128	
Paraguay	December 6	4 8, 432 4, 600 4 37, 065					I	
Argentina	do	* 37,065					4 10 32, 212	
Estimated total 7		101, 500						
		101,000						
Europe:	June	5, 824	6, 253	8 975	a 00a	5, 958	E 050	0.004
England and Wales Isle of Man	do	19	0, 200	6, 275 19	6, 026 19	20	5, 850 20	6,064
Continud	do	1, 171	1, 198	1, 210	1, 214	1, 233	1, 233	1, 208
Northern Ireland	do	748	667	1 697	738	1 700	673	680
Northern Ireland Irish Free State Norway <sup>11</sup>	do	4, 266	3,947	4,047	4, 125	4, 137	4,038	4,029 1,310
Norway 11	do	1,128	1.7481	1,209	1, 221	1, 224	1, 251	1,310
Sweden Denmark Netherlands		2,418 2,613		- 45 000		9 096	3, 060	
Notherlands	July (May-June) 4 December 6	2,063	2,838	2, 913	3, 016			3, 197
Belgium	December 6	1,550	1, 655	1,712	1, 739	1, 751	1, 738	1,759
France	do	13, 582	14, 373	14, 482	14, 941	15,005	15,631	15, 467
Spain	do	3, 457 754	1, 655 14, 373 8, 794	3,688		1,751 15,005 4 8,660		
Portugal	737777777777777777777777777777777777777	754						J
Italy 8 Switzerland	(March-April)	6,812 1,425	5 7, 400				4 6, 902	41 800
Germany.	December 6. (December-April). December 6.	16, 786	4 1, 587 17, 202	17, 221	18, 011	18, 414	18, 033	4 1,609 18,431
Austria	(December-April).	2, 241	I	1			4 2, 313	1
Ozechoslovakia	December 6	4, 337						4,458
Hungary Yugoslavia <sup>8</sup> Greece <sup>8</sup>	April	1,866	1,847	1,805	1, 812	1,819	1,785	1,814
Greene 8	December 6	4, 122	8, 738 890	3, 760 964	3, 686 947	3, 765 955	874	3,850
Rulgaria i	do	1, 928		2, 260	021	0110	01.2	1
Rimania 8	do	5, 570	5. 219	4, 992	4, 537	4,442	4, 355	4,011
Poland Lithuania	November	8,063	l	8,602	1	1 9.057	9.400	II V. 782
Lithuania Latvia		1, 149 867	1,396 955	1,128	1,199	1, 160 8 978	1.170	
Estonia	June July	508	599		961 351	604	1, 026 627	1,117
Winland	September	1,847	1,860	1,872	217	1, 903	02/	
Russia, European and	1 -			1	i		ĺ	
ASIBILU	Summer	58, 263	63, 025	68, 158	70, 700	67, 200	53, 800	
Estimated total ex-			<b></b>		l			
cluding Russia 7		98,000						
Africa:	1					-		
Abyssinia (Ethiopia)		(4, 000) 1, 711 853	l		4,000	l	l	l
Morocco		1,711	1,933	1,865	1,814	2, 151	2,092	
Algeria Tunis	September December 6	853	946	849	887	807	1 939	1
French West Africe	December	459 2, 165	370 2, 329	468	501			
French West Africa French Sudan		1,086	910	2, 402 1, 030	2, 529 909	4 2, 844 4 1, 139	2,825 1,100	i
Nigeria, including British Oameroon		] -, 550	i	1		2, 100	1,100	1
	4		0 100	2,997	3, 095	3, 083	2,978	
Cameroon		2,909	0, 102	4,000	0,000			
Cameroon Egypt 8	September	2, 909 1, 310	1.485	1 7 497	1,580	1.625	1 1 579	
Anglo-Fountier Suden	September	1,310	1,485	1 7 497	1,580	1, 623 1, 504	1,572 1,300	)i
Angio-Egyptian Sudan Italian Somaliland Eritres	February	1,310 864 491,246	1,485	1, 497	1,580	1, 623 1, 504	1,572 1,300	)i
Anglo-Egyptian Sudan Italian Somaliland Eritrea Kenya Colony	February	1,310 864 491,246 553 3,038	1,485	1, 497	1, 580 1, 503 4 1, 106	1, 623 1, 500 1, 113	1, 572 1, 300 1, 113	
Anglo-Egyptian Sudan Italian Somaliland Eritrea Kenya Colony Uganda	February  March-June December	1,310 864 491,246 553 3,038 1,106	1,485	1, 497	1,580 1,503 41,106 4799 3,482	1, 623 1, 500 1, 113	1, 572 1, 300 1, 113	
Anglo-Egyptian Sudan Italian Somaliland Eritrea Kenya Colony	February  March-June December	1,310 864 491,246 553 3,038	1, 485 1, 500 3, 418 1, 342 5 881	1, 497 1, 501 748 3, 476 1, 338	1,580 1,503 41,106 4799 3,482 1,733	1, 625 1, 500 1, 115 2 3, 498 1, 710	1, 572 1, 300 1, 113 3 5, 193 1, 911	

See footnotes at end of table.

Table 315.—Cattle: Number in countries having 150,000 or over, average 1921-1925, annual 1926-1931—Continued

				,				
Country	Month of estimate	Average 1921– 1925 <sup>1</sup>	1926	1927	1928	1929	1930	1981
Africa—Continued. Ruanda-Urundi		Thou- sands 700	Thou- sands 750	sands	Thou- sands 800	Thou- sands 820	Thou- sands 1,000	Thou- sands
Angola-Portuguese West Africa Mozambique (Portuguese		524	742	1, 053	1, 074	1, 423		
East Africa)  British Southwest Africa		342 561	621	555	655	698	655	
Bechuanaland Union of South Africa Basutoland	April-May	482 9, 459 604	518 10, 514 645	10, 590	10,650	13 10, 695	649	
Rhodesia— Northern Southern			382	363	416	441	473	
Southern Swaziland Tanganyika Territory Madagascar	do	1, 794 244	185	300	350	367	2, 468 380	
			4, 479	7,362	6, 901		7, 048	
Estimated total 7 Asia:		50,000						
Turkey, European and Asiatic <sup>8</sup> Persia Syria and Lebanon		a 1.000		5, 772		l		
India 8		257	243					
British Native States Ceylon 8 China, including Turke-	December	1,459	33, 276 1, 457	151, 288 84, 643 1, 537	33,409	33,671	4 43, 207	
stan and Manchuria.	Thorombow 6	22,000 1,440 1,567 407	1,591 379	1 381	1,586	1,570	1,586 390	1,612
Chosen <sup>8</sup> Taiwan <sup>8</sup> French Indo-China <sup>8</sup> Siam <sup>8</sup> Philippine Islands <sup>8</sup> Dutch East Indies—			8, 230 2, 622	l '	8, 657 2, 958	9,879 8,064	9, 153	
Java and Madura Outer Possessions	do	5, 287 1, 872	5, 721 1, 965	5, 680 1, 952	5, 781 1, 981	5, 658 2, 022	5, 700 2, 049	5, 768 2, 064
Estimated total, ex- cluding Russia 7		235, 200						
Oceania: Australia New Zealand	December 6 January	13, 789 3, 393	13, 280 3, 452	11, 963 3, 258	11, 617 3, 274	11, 301 3, 446	11, 202 3, 766	
Estimated total 7 Total countries re-		17, 400						
porting all periods, including Russia— To 1930 (55) <sup>18</sup> —— To 1931 (17) <sup>18</sup> <sup>18</sup> — Estimated world		447, 738 136, 263	455, 142 130, 391	460, 310 128, 989	462, 277 129, 119	461, 511 130, 246		133 <b>, 82</b> 3
total, including Russia 7		648, 300			ļ			

Bureau of Agricultural Economics. Compiled from official sources and the International Institute of Agriculture unless otherwise stated. Figures in parenthesis interpolated.

<sup>&</sup>lt;sup>1</sup> Average for 5-year period if available; otherwise, for any year or years within this period except as otherwise stated.

<sup>2</sup> Incomplete.

<sup>3</sup> Year 1918.

Census.
Unofficial.

<sup>6</sup> Countries reporting as of December have been considered as of Jan. 1 of the following year; i. e., figures for number of cattle in France as of Dec. 31, 1925, have been put in the 1926 column, etc.
7 This total includes interpolations for a few countries not reporting each year and rough estimates for

<sup>7</sup> This total includes interpolations for a few countries not reporting each year and rough estimates for some others.

8 Buffaloes included.

9 Year 1920.

19 June, 1930.

11 In rural communities only.

12 Years 1924-1926, from Statistical Review, October, 1928, p. 6; year 1927, Agricultural Statistics of the U. S. S. R., Lenin Academy, 1927-1930—Planned Economy No. 12, 1930, State Planning Board.

18 Number in towns assumed to be same as in 1927; i. e., 177,000 and added in for purposes of comparison with proceding years.

with preceding years.

14 Including 1926 estimate of 1,324,500 cattle and buffaloes in order to compare with preceding estimates.

15 Omparable totals for number of countries indicated.

16 Excluding Russia as figures are not available for 1931.

Table 316.—Cattle and calves: Receipts and stocker and feeder shipments at all public stockyards, 1922-1931

# RECEIPTS, CATTLE

Year	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1922 1923 1924 1925 1926 1927 1928 1929 1930	Thou-sands 1, 222 1, 395 1, 388 1, 353 1, 314 1, 327 1, 272 1, 160 1, 155 1, 040	Thou-sands 1, 044 1, 038 1, 041 1, 056 1, 065 1, 080 1, 045 814 909 878	Thou-sands 1, 145 1, 044 1, 084 1, 273 1, 233 1, 172 966 953 1, 045 1, 017	Thou-sands 1,009 1,159 1,161 1,201 1,146 1,107 1,119 1,148 1,066 1,057	Thou-sands 1, 358 1, 305 1, 317 1, 139 1, 277 1, 348 1, 188 1, 097 984 1, 027	Thou-sands 1, 217 1, 138 1, 172 1, 160 1, 279 1, 185 1, 057 977 996 1, 017	Thou-sands 1, 255 1, 357 1, 254 1, 399 1, 279 1, 089 1, 158 1, 166 1, 012 1, 035	Thou-sands 1, 608 1, 622 1, 898 1, 632 1, 421 1, 494 1, 308 1, 156 1, 062 1, 302	Thou- sands 1, 802 1, 782 1, 938 1, 592 1, 827 1, 482 1, 669 1, 572 1, 512 1, 279	Thou- sands 2, 243 2, 141 2, 096 2, 126 2, 030 2, 008 1, 913 1, 787 1, 677 1, 531	Thou- sands 1, 846 1, 650 1, 796 1, 717 1, 836 1, 749 1, 419 1, 405 1, 180 1, 312	Thou- sands 1, 392 1, 368 1, 528 1, 470 1, 327 1, 217 1, 207 1, 104 1, 202 991	Thou- sands 17, 141 16, 999 17, 173 17, 117 17, 034 16, 258 15, 189 14, 337 13, 799 13, 486
	··				REC	EIPTS	, CAL	VES					
1922	406 482 500 516 526 504 499 479 484 468	372 389 415 473 486 476 471 381 418 425	477 458 472 588 578 571 499 497 502 518	461 511 590 626 564 567 566 606 578 560	520 595 574 597 616 607 610 563 533 524	542 492 502 586 592 547 501 475 464 522	456 546 544 572 511 457 492 499 499	541 592 536 612 576 571 521 483 543 519	595 512 628 566 570 507 522 531 596 518	693 661 640 663 644 627 629 620 700 606	581 532 567 565 625 598 544 538 517 554	488 442 555 586 519 473 435 451 531 462	6, 077 6, 212 6, 523 6, 950 6, 837 6, 505 6, 289 6, 103 6, 368 6, 129
-		E	STOCE	ER AI	ND FE	EDER	SHIP	MENI	S, CA	TTLE			
1922	223 262 231 194 207 187 215 159 201 189	234 199 165 163 164 162 175 106 173 130	266 186 167 213 171 182 154 146 176 126	223 221 230 254 190 184 236 266 219 156	338 288 267 198 201 215 263 266 172 135	243 220 191 143 158 157 165 157 108 100	216 212 161 234 188 128 175 159 99 108	453 459 293 347 240 252 312 246 130 231	595 608 556 409 495 384 525 394 368 340	792 734 724 681 648 626 704 673 570 495	630 577 497 449 521 548 420 459 375 381	331 338 288 308 273 278 218 219 267 207	4, 544 4, 301 3, 770 3, 593 3, 456 3, 303 3, 562 3, 562 2, 858 2, 601
		į.	STOOR	ER A	ND F	EDEI	R SHIF	MEN	rs, ca	LVES			
1922	10 19 11 12 18 18 19 32 83	9 12 5 13 13 19 12 28 18	16 13 8 17 13 18 19 16 30 20	11 9 17 13 19 18 26 36	21 12 8 18 17 20 21 28 28 18	17 14 10 11 11 12 19 19 21	7 11 9 9 11 10 21 14 10 16	16 21 13 13 12 19 24 20 20 30	35 28 24 18 26 22 37 29 75 41	72 51 39 87 45 49 94 85 121 86	80 47 51 10 49 67 76 97 103 103	26 15 21 25 28 41 35 64 38	320 249 208 230 256 306 403 401 568 434

Bureau of Agricultural Economics. Compiled from data of the livestock and meat reporting service of the bureau. Earlier data in 1930 Yearbook, p. 829, Table 353.

Table 317.—Cattle and calves: Receipts at principal public stockyards and at all public stockyards, 1922-1931

#### CATTLE

Year	Chi- cago	Den- ver	East St. Louis	Fort Worth	Kan- sas City	Omaha	St. Joseph	South St. Paul	Sioux City	Total 9 mar- kets <sup>1</sup>	All other stock- yards report- ing	Total all stock- yards report ing 1
1922 1923 1924 1925 1925 1920 1927 1927 1928 1929 1930	Thou-sands 3, 163 3, 157 3, 203 3, 023 3, 257 2, 872 2, 505 2, 388 2, 239 2, 287	Thou- sands 587 561 572 527 473 577 590 556 505 440	Thou- sands 1,026 1,041 1,034 1,038 1,074 1,004 900 832 820 792	Thou- sands 760 947 1,049 1,060 944 956 886 762 638 598	Thou- sands 2,443 2,632 2,471 2,409 2,183 2,070 1,859 1,836 1,802 1,665	Thou-sands 1,612 1,685 1,759 1,593 1,692 1,463 1,423 1,444 1,485 1,570	Thou- sands 554 608 602 609 563 541 511 500 459 433	Thou- sands 930 839 790 995 1,180 955 917 879 779 811	Thou- sands 691 714 798 845 885 747 750 778 774 769	Thou- sands 11, 766 12, 183 12, 278 12, 298 12, 251 11, 186 10, 342 9, 974 9, 501 9, 364	Thou- sands 5, 375 4, 816 4, 895 5, 019 4, 783 5, 072 4, 847 4, 363 4, 298 4, 122	Thou sands 17, 141 16, 909 17, 173 17, 117 17, 034 16, 258 15, 189 14, 337 13, 799 13, 486
		<u></u>	·		C7T	VES	<u>'</u>		·		•	<u>'</u>
1922 1923 1924 1925 1927 1927 1928 1929 1930	771 761 794 848 755 710 762 672 557 547	70 59 59 60 56 63 77 68 88 64	375 358 350 406 452 444 415 391 383 379	324 311 343 310 241 330 325 327 331 213	540 576 572 549 433 400 351 342 304 292	132 108 104 116 123 98 94 102 120	100 101 117 125 116 99 87 89 100 76	457 510 534 641 730 627 573 546 359 603	56 45 38 52 84 62 63 61 82 82	2, 825 2, 829 2, 910 8, 108 2, 991 2, 834 2, 746 2, 601 2, 586 2, 406	3, 252 3, 383 3, 613 3, 842 3, 846 3, 671 3, 543 3, 5502 3, 782 3, 723	6, 077 6, 212 6, 528 6, 950 6, 837 6, 505 6, 289 6, 103 6, 368 6, 129

Bureau of Agricultural Economics. Compiled from data of the livestock and meat-reporting service of the bureau. Receipts, 1900–1921, are available in 1924 Yearbook, p. 840, Table 435.

Table 318.—Beef cattle and veal calves: Estimated average price per 100 pounds received by producers in the United States, 1922-1931

#### BEEF CATTLE

Year	Jan. 15	Feb.	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept.	Oct.	Nov. 15	Dec.	Weight- ed aver- age
1922 1923 1924 1925 1926 1926 1927 1928 1929 1930	5. 63 6. 31 6. 45	Dolls. 5.07 5.55 5.47 5.69 6.42 6.60 8.72 8.89 8.68 6.03	Dolls. 5.46 5.62 5.63 6.18 6.65 6.82 8.81 9.16 8.77 6.03	Dolls. 5.53 5.78 5.82 6.55 6.06 7.13 8.92 9.53 8.65 6.00	Dolls. 5.70 5.77 5.94 6.48 6.57 7.17 9.09 9.72 8.36 5.67	Dolls. 5.84 5.82 5.79 6.46 6.56 7.08 9.10 9.72 8.20 5.26	Dolls. 5. 76 5. 72 5. 65 6. 55 6. 46 7. 13 9. 19 9. 80 7. 12 5. 16	Dolls. 5. 51 5. 60 5. 67 6. 58 6. 29 7. 21 9. 52 6. 20 5. 09	Dolls. 5. 44 5. 70 5. 53 6. 27 6. 48 7. 42 9. 96 9. 22 6. 01 5. 00	Dolls. 5. 48 5. 48 5. 52 6. 29 6. 43 7. 55 9. 63 8. 92 6. 54 4. 76	Dolls. 5. 29 5. 23 5. 43 6. 14 6. 32 8. 00 9. 27 8. 63 6. 41 4. 81	Dolls. 5.28 5.26 5.35 6.18 6.42 8.32 8.94 8.48 6.37 4.38	Dolls. 5. 43 5. 57 6. 59 6, 26 6. 46 7. 54 9, 18 9, 20 7. 43 5. 31
				7	VEAL	CAL	VES						
1922 1923 1924 1925 1926 1927 1927 1928 1930	7. 23 8. 05 8. 36 8. 50 9. 44 9. 75 10. 88 12. 20 11. 84 8. 61	7. 84 8. 37 8. 51 8. 87 9. 86 10. 10 11. 30 12. 17 11. 69 8. 20	7. 85 8. 20 8. 43 9. 21 9. 75 10. 10 11. 34 12. 51 11. 24 7. 66	7. 26 7. 78 8. 33 8. 80 9. 45 9. 90 11. 18 12. 10 10. 73 7. 38	7. 28 7. 69 8. 14 8. 35 8. 92 9. 37 11. 18 12. 11 9. 68 7. 15	7. 67 7. 66 7. 91 8. 18 9. 65 9. 46 11. 56 12. 06 9. 83 6. 81	7. 49 8. 00 7. 88 8. 65 9. 47 9. 82 11. 87 12. 40 9. 19 6. 66	7. 67 8. 00 7. 94 8. 80 9. 54 10. 37 12. 32 12. 39 8. 78 6. 75	8. 10 8. 34 8. 09 9. 07 10. 06 10. 78 13. 05 12. 52 9. 20 6. 95	8. 17 8. 37 8. 22 9. 52 10. 29 11. 04 12. 62 12. 16 9. 30 6. 58	7. 92 7. 85 7. 89 9. 16 9. 54 10. 67 11. 99 11. 80 8. 84 6. 02	7.78 7.75 7.84 9.17 9.44 10.71 11.82 11.69 8.48 5.59	7. 68 7. 99 8. 12 8. 85 9. 61 10. 16 11. 79 12. 18 9. 83 7. 00

Bureau of Agricultural Economics. Based on reports of special price reporters. Monthly prices of boot cattle, by States, weighted by number of cattle Jan. 1 to obtain a price for the United States; monthly prices of veal calves, by States, weighted by number of milk cows Jan. 1 to obtain a price for the United States; yearly price obtained by weighting monthly prices by receipts at principal markets.

<sup>1</sup> Rounded totals of the complete figures.

Table 319.—Feeder cattle, inspected: Shipments from public stockyards, 1922-1931

Bureau of Agricultural Economics. Compiled from Bureau of Animal Industry inspection records.

Table 320.—Cattle, choice steers for chilled beef: Average price per 100 pounds, by months, Buenos Aires, 1909-1931

Year	Jan,	Feb.	Mar.	Apr.	Мау	June	July	Aug.	Sept.	Oct.	Nov.	1)ec.	Aver- ago
1922 1923 1924 1925 1926 1927 1928 1929 1930	Dolls. 4.68 3.08 3.19 5.54 5.40 4.21 6.11 5.83 5.80 3.37	Dolls. 4.53 3.25 3.40 5.54 5.42 4.73 5.86 5.89 5.35 3.75	Dolls. 3, 97 8, 82 3, 61 6, 20 5, 27 4, 63 6, 21 5, 87 5, 39 4, 21	Dolls. 3, 30 4 06 3, 50 6, 20 5, 39 5, 03 6, 33 5, 76 5, 74 4, 10	Dolls. 3. 31 3. 83 3. 56 6. 51 5. 52 4. 81 6. 65 5. 93 5. 57 3. 87	Dolls. 3, 90 3, 56 3, 76 6, 48 5, 24 5, 15 6, 99 5, 98 5, 44 3, 74	Dolls. 4.41 3.02 4.51 6.54 5.58 5.05 6.79 6.07 5.27 3.54	Dolla. 4.50 3.36 4.93 6.72 5.70 6.55 6.60 6.07 5.27 3.58	Dolla. 4.24 3.82 5.15 6.91 5.45 6.84 6.67 6.06 5.22 3.31	Dolls. 3.84 4.10 5.95 6.25 4.63 7.13 6.38 6.68 4.91 2.64	Dolls. 3. 30 3. 48 5. 62 5. 66 4. 06 6. 34 5. 61 6. 19 4. 52 2. 54	Dolls. 3.25 3.42 5.32 4.21 5.82 5.85 5.85 5.32 4.5	Dolls. 3, 94 3, 60 4, 38 6, 16 5, 16 5, 52 6, 29 6, 02 5, 19 3, 42

Bureau of Agricultural Economics. Calculated from quotations in the Review of the River Plate. Prices prior to May, 1924, originally quoted on basis of price per head supplemented by price per pound of dressed carcass weight. Calculations assume average dressed weight of 730 pounds or live weight of 1,259 pounds. Live-weight quotations per pound from May, 1924. Converted at average monthly rate of exchange as given in Federal Reserve Bulletins.

<sup>&</sup>lt;sup>1</sup>Includes 2 head shipped to Alaska in 1925 and 10 head in 1926.

Table 321.—Cattle and calves: Average price per 100 pounds, Chicago, by months, beef steers, 1909-1931; veal calves, 1922-1931

### BEEF STEERS 1

Year	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver- age
	Dolls.	Dolla.	Dolla.	Dolls.	Dolla.	Dolls.	Doles.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.
1909	6.00	5.85	6.10	6.10	6.45	6.45	6.45	6.70	6.75	6, 60	6.45	6.20	6, 35
1910	6. 20	6.35	7.35	7.55	7.50	7.50	7.10	6.85	6,80	6. 60	6.20	6.00	6.80
1911	6.15	6.15	6.20	6.10	5. 95	6.05	6.30	6.95	6.80	6. 75	6.70	6.65	6.40
1912	6.85	6.60	7. 20	7.65	7.95	8.00	7.90	8.50	8. 15	7.90	8.10	7.85	7.75
1913	7.80	8. 25	8.30	8.15	8.00	8.15	8, 25	8.30	8.50	8.40	8, 25	8.20	8.25
1914	8.45	8. 30	8.35	8.50	8.40	8.60	8.80	9.10	9.35	9.05	8.60	8.35	8.65
1915	8.05	7. 50	7.65	7.70	8.35	8.80	9. 20	9.05	8.95	8. 80	8.70	8.45	8.40
1916	8.35	8. 35	8.75	9.10	9.50	9.85	9. 25	9.45	9.40	9. 75	10.15	10.00	9.50
1917	10.15	10.50	11.25	11.75	11.90	12.15	12.35	12.70	13.10	11.70	11.10	11.40	11.60
1918	12.10	12.00	12.60	14.70	15.40	15.85	16.05	15.75	16.00	14.80	15.05	14.90	14.65
1919	15.80	15.95	16.05	15.85	15.00	13.55	15.60	16.45	15.50	16. 15	15.10	14.35	15, 50
1920	13.95	13. 05 8. 20	13.10 9.05	12.30 8.15	12, 25 8, 25	14.95 8.00	15.00	14.85	15.05	14. 20	12.00	10.10	13.30 8.20
1921	8.70	7.62	7.87	7.90	8. 21	8.76	8.10	8, 50 9, 52	8.00	8. 10 10. 23	7.40 9.16	7.00 8.76	8.65
1922 1923	7. 23 8. 88	8.62	8.70	8.81	9. 28	9.74	9.42 9.71	10.36	9.84	9.94	9.46	8.96	9.40
1924	8.90	8.81	9. 17	9. 52	9. 59	9.28	9.31	9, 53	9, 52	9. 57	8.90	8.71	9. 24
1925	8. 97	9, 15	9. 93	9.99	9. 90	10.34	11.28	11.10	11.04	10, 80	10.16	9.72	10.16
1926	9.48	9, 42	9.42	9.11	9. 07	9. 51	9.44	9.30	10.00	10.00	9.48	9, 43	9.47
1927	9.70	9.81	10. 20	10.51	10.68	11.12	11.78	12.02	12, 63	13. 43	13. 57	13.08	11.36
1928	13.67	13.15	12.83	13.01	13, 19	13.86	15.11	15.30	15.91	14. 61	13.84	12,86	13.91
1929	12.51	11.92	12.68	13.52	13. 67	14.10	14.59	14. 22	13.92	13. 81	18.00	12.74	13, 43
1930	12.62	12.46	12.33	11.88	11. 15	10.59	9.42	9.48	10.95	10. 64	10.47	10.17	10.95
1931	9.43	8.36	8.40	7.82	7.30	7.43	7.62	8.53	8.29	8. 38	8.53	7.11	8,06

#### VEAL CALVES

Bureau of Agricultural Economics. Beef-steer prices prior to 1922 from Chicago Drovers Journal Year-book, general average native beef cattle. Subsequent figures are the weighted average price of all grades of beef steers sold out of first hands at Chicago. Veal-calf prices from the livestock and meat reporting service of the bureau on medium to choice grades prior to July 1, 1927, and subsequent prices on good and choice grades.

<sup>1</sup> Western steers not included.

Table 322.—Cattle and calves: Slaughter in specified countries, annual 1921-1931

Year	United States, Federal inspected	Canada, total	Argentina, including chilling, freezing, salting, and canned- meat works 1	Uruguay, excluding farm	Australia, total	New Zealand, total <sup>3</sup>
1921 1922 1923 1924 1925 1926 1927 1927 1928 1929 1930	Thousands 11, 416 12, 860 13, 663 14, 528 15, 206 15, 333 14, 396 18, 147 12, 813 12, 765 12, 824	Thousands 2,017 1,899 1,850 1,864 1,921 1,902 1,993 1,949 1,953 5 1,904 (9)	Thousands 1, 550 2, 231 3, 338 4, 321 3, 871 3, 510 3, 723 3, 189 3, 024 2, 930 2, 453	Thousands 717 1, 109 1, 393 1, 173 1, 233 1, 293 1, 272 1, 222 1, 285	Thousands 1, 649 1, 907 2, 049 2, 505 2, 434 2, 160 2, 189 2, 200 41, 947 (4)	Thousands 304 398 485 573 550 519 636 806 811 886

Bureau of Agricultural Economics. Compiled from official sources and cabled reports from agricultural representatives abroad

Table 323.—Cattle and calves: Average price per 100 pounds, at Chicago and Kansas City, by months, July, 1930-December, 1931 CHICAGO

_															
					Slau	hter c	attle						lers	Fee	
			В	eef ste	ers				fers	٥٥	W8	(mill	r-fed)	Wei	ghts
Year and month	900	-1,100	poun	is	1,100- pou	-1,300 nds	pounds,	(550 pou	⊢850 nds)		nd Me-	hoice		Choice	nd Me-
	Choice	Good	Medium	Common	Cholce	Good	1,300-1,500 pounds, Choice	Choice	Good	Good	Common and dium	Good and choice	Medium	Good and Choice	Common and Me- dium
						_	_								
1930 July August September October November December	\$11. 04 10. 95 12. 28 12. 66 13. 12 13. 48	11.17 11.24 11.62	9. 56 9. 35 9. 36	7. 56 7. 19 7. 32	12.06 11.94 12.54	\$9. 95 9. 93 10. 67 10. 39 10. 97 11. 26	10.62 11.77 11.60 11.83	12.17 12.38 12.29	9.92 10.86 11.03 10.53	6. 22 6. 00 6. 16 5. 80	4.99 4.61 4.76	11. 98 11. 83 11. 33 9. 58	9.89 9.16	7. 36 7. 91 8. 00 8. 10	5. 96 6. 22 6. 14 6. 34
Average, 6 months	12, 26	10. 92	9. 19	7. 19	11, 92	10. 53	11. 58	11. 64	10. 30	6, 12	4.81	10. 97	9.08	7. 92	6. 24
1931 January February March April May June July August September October November December	13. 42 11. 32 10. 76 9. 77 8. 59 8. 43 8. 59 9. 75 9. 73 10. 33 11. 62 10. 98	9. 76 9. 54 8. 74 7. 78 7. 76 7. 89 8. 86 8. 55 8. 93 9. 64	7. 97 8. 11 7. 63 7. 09 7. 05 6. 90 7. 31 6. 81 6. 90 7. 02	6. 66 6. 94 6. 54 6. 13 6. 15 5. 81 5. 50 5. 02 4. 95 5. 06	8. 15 9. 47 9. 72 10. 42 11. 95	9.92	11. 40 10. 75 9. 69 8. 44 7. 94 7. 84 9. 34	9. 03 9. 12 8. 35 7. 75 8. 09 8. 28 9. 35 9. 37 9. 99	7. 63 8. 07 7. 39 6. 99 7. 39 7. 46 8. 11 8. 10 8. 00 8. 02	4. 98 5. 39 5. 26 5. 03 4. 78 4. 62 4. 61 4. 32 4. 13	3. 78 3. 50 3. 42 3. 51 3. 46	7, 98 8, 12 8, 35 8, 48 7, 81 9, 32 9, 28 7, 75 6, 56	7. 65 6. 42 6. 62 7. 08 7. 04 6. 49 7. 52 7. 57 6. 58 5. 06	7.80 7.59 7.30 6.70 6.38 6.44 6.08 5.96 6.17	5. 95 6. 20 6. 24 6. 03 5. 51 4. 97 4. 86 4. 46 4. 38
Average	10. 27	8. 97	7. 32	5. 85	10. 26	8. 92	10.17	8. 99	7.72	4. 78	3. 93	8. 33	6. 80	6. 80	5. 28

<sup>1</sup> Including municipal and private slaughterhouses, the figures were as follows in thousands—averages 1921-1925, 5,961; 1926-1930, 6,389. The numbers killed in freezing and chilling plants alone were as follows in thousands—1925, 3,342; 1928, 3,067; 1927, 3,224; 1928, 2,830; 1929, 2,792; 1930, 2,679; 1931, 2,297.

3 Slaughtering in freezing and chilling plants alone were as follows in thousands—1925, 651; 1926, 714; 1927, 695; 1928, 697; 1929, 853; 1930, 1,108; 1931, 901.

5 For years ended Mar. 31, following.

4 Slaughter for export, only, was 425,000 in 1931 compared with 429,000 in 1930 and 471,000 in 1929.

5 Inspected slaughter, only, was 963,000 in 1931 compared with 897,000 in 1930.

Table 323.—Cattle and calves: Average price per 100 pounds, at Chicago and Kansas City, by months, July, 1930-December, 1931—Continued

## KANSAS CITY

					SI	aughte	or catt	e				1	eede	steer	·s
			В	eef ste	ers			Heifer 850 pe	s,550- ounds	Co	ws		-800 nds	800-: pou	1,050 nds
Year and month	900	-1,100	poun	ds	1,100- pou	1,300 nds	pounds				nd Me-	Choice	nd Me-	Choice	nd Me-
	Choice	Good	Medium	Common	Choice	Good	1,300-1,500 pounds Choice	Choice	Good	Good	Common and Medium	Good and	Common and dium	Good and	Common and Medium
1980															
JulyAugust September October November December	\$10. 46 10. 18 11. 91 11. 96 12. 35 12. 77	\$9. 37 9. 20 10. 37 10. 45 10. 70 10. 85	8.33	\$6, 28 5, 72 6, 22 5, 81 5, 86 6, 13	\$10.34 10.06 11.60 11.03 11.12 12.11	\$9. 27 8. 91 10. 20 9. 91 9. 93 10. 52	11, 35 10, 63 10, 56	11.80 11.72	10.30	\$0. 27 5. 82 5. 79 5. 55 5. 58 5. 77	\$5. 00 4. 60 4. 57 4. 41 4. 42 4. 65	7.65 8.03	5. 17 5. 44	7.35	5. 63
Average, 6 months	11. 60	10. 16	8. 01	6. 00	11.04	9, 79	10. 74	11.06	9. 71	5. 80	4. 61	7.84	5. 38	7, 64	5. 67
January February March April May June July August September October November December	12. 58 10. 79 9. 90 9. 00 8. 15 8. 08 8. 13 9. 39 9. 12 9. 55 10. 92 9. 84	10. 45 8. 92 8. 65 7. 95 7. 20 7. 30 7. 22 8. 38 7. 96 8. 01 8. 72 7. 91	6. 02	5. 84 5. 76 5. 20 5. 78 4. 80 4. 00	9.00 9.71 11.06	10. 31 9. 00 8. 65 7. 93 7. 06 6. 80 6. 90 8. 04 7. 76 8. 10 8. 76 7. 80	10. 54 9. 84 8. 97 7. 76 7. 48 7. 29 8. 78 8. 87 9. 71 11. 06	8.30	7. 08 6. 76 7. 24 7. 24 7. 90 7. 26 7. 04 7. 18	5. 23 4. 72 4. 40 4. 06 4. 13 3. 96	4. 48 4. 01 4. 35 4. 59 4. 18 3. 62 3. 19 3. 22 3. 07 3. 25 3. 00	7. 64 7. 78 7. 54 7. 23 6. 67 6. 13 6. 22 5. 61 5. 50 5. 79	5. 33 5. 42 5. 32 5. 13 4. 74 4. 10 3. 90 3. 82 3. 70	7.34 7.14 6.71 6.21 5.81 6.20 5.58 5.42 5.56	5. 41 5. 58 5. 52 5. 34 4. 87 4. 42 4. 22 3. 89 3. 78 3. 88
Average	9. 62	8, 22	6. 34	4. 88	9.48	8.11	9, 80	8. 50	7. 25	4. 48	3. 68	6. 60	4. 52	6. 32	4. 67

Bureau of Agricultural Economics. Compiled from data of the livestock and meat-reporting service of the bureau. Earlier data in 1927 Yearbook, pp. 991-994, and in 1931 Yearbook, pp. 834-835.

Table 324.—Cattle and calves: Slaughter 1 under Federal inspection by months, 1922-1931

#### CATTLE

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1922 1923 1924 1925 1926 1928 1928 1929 1930 1931	Thou- sands 642 745 812 855 819 780 711 736 713 651	Thou- sands 569 634 669 056 056 095 700 666 569 561 559	7hou- sands 674 688 665 730 761 665 632 615 635	Thou-sands 500 697 689 731 700 742 623 662 635 690	Thou-sands 702 702 773 749 788 785 723 676 689 704	Thou-sands 724 727 070 732 852 799 706 636 654 667	Thou- sands 697 725 764 862 864 743 662 706 710 708	Thou- sands 761 821 786 811 811 838 717 726 700 727	Thou- sands 796 810 870 866 971 828 764 753 760 687	Thou- sands 884 953 1,016 1,067 996 805 801 839 836 781	Thou- sands 859 846 952 801 947 881 702 731 605 614	Thou- sands 779 756 920 927 887 761 667 658 692 686	Thou- sands 8, 678 9, 163 9, 593 9, 853 10, 180 9, 520 8, 467 8, 324 8, 170 8, 108
				!		CAL	VES						
1922 1923 1924 1925 1925 1927 1928 1929 1930	288 351 373 394 410 397 383 369 374 379	279 297 346 378 378 377 374 311 329 353	301 368 377 466 404 457 407 409 388 416	365 400 408 496 401 454 438 460 455 471	401 467 470 481 455 462 473 427 421 425	389 388 408 473 480 430 398 344 356 417	329 379 421 473 425 355 302 303 375 356	345 403 374 439 379 389 369 338 303 357	353 338 419 422 408 357 352 365 374 393	383 416 473 486 440 413 405 398 438 407	348 370 392 398 435 410 378 358 324 355	309 324 416 445 410 376 841 346 398 388	4, 182 4, 500 4, 935 5, 353 5, 153 4, 877 4, 680 4, 489 4, 505 4, 717

Bureau of Animal Industry.

<sup>&</sup>lt;sup>1</sup> The figures include condemned carcasses.

Table 325.—Beef and beef products: International trade, average 1925-1929, annual 1928-1930

				Calenda	ar year			
Country	Average	1925–1929	19	)28	19	129	19	30 1
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES Argentina	284, 476 237, 540 144, 303 115, 286 109, 765 42, 516 27, 793 23, 193 17, 646	1,000 pounds 93 0 1,711 159,721 45,769 626 7,221 1,867 12,359 8,935 2,032 4 387 8,531 1,619 207	1,000 pounds 1,300,898 226,384 246,146 236,390 119,779 143,181 148,933 52,111 10,857 17,793 13,222 11,446 14,478 4,903 2,661	1,000 pounds 238 0 2,385 128,389 81,020 602 9,198 2,649 10,725 9,138 2,395	1,000 pounds 1, 234, 142 215, 404 277, 586 205, 521 126, 442 91, 082 167, 272 83, 192 14, 613 25, 950 12, 918 213, 705 9, 515 3, 050 3, 838	1,000 pounds 63 0 1,211 117,779 69,268 796 5,535 5,324 11,142 9,158 1,521 2,865 1,865 1,865 5,860	1,000 pounds 1,114,480 1 829,829 224,986 179,228 117,985 103,008 232,362 10,016 51,966 30,585 23,467 18,989 4,946 3,061 9,626	1,000 pounds 66 3 0 803 137,113 15,339 592 5,794 8,403 6,811 1,904 1,915 6,865 1,815
Total	2, 872, 975	251, 128	2, 556, 147	25×, 535	2, 434, 230	228, 233	2, 464, 614	183, 771
PEINCIPAL IMPORTING COUNTRIES United Kingdom Germany France Belgium	4, 267	1, 795, 864 386, 911 147, 055 122, 165	5, 887 45, 712 31, 866	1, 749, 139 332, 852 63, 515 83, 253	23, 446 8, 656 39, 973 18, 977	1, 638, 697 253, 740 57, 150 76, 711	29, 176 21, 478 38, 078 19, 638	1, 640, 993 193, 629 112, 043 88, 662
Belgium Japan Cuba Lisaly Sweden Spain Norway British India Philippine Islands Czechoślovakia British Malaye Switzerland Friland Egypt Chile	335 8,759 55 1,880 1,254 0 464 682 799 899	68, 201 44, 490 23, 611 19, 664 16, 785 14, 386 11, 346 11, 013 8, 165 6, 958 6, 373 5, 235 4, 767 3, 645	1, 076 236 6, 881 220 2, 434 1, 399 679 611 62 16 129	68, 918 45, 773 24, 650 16, 416 16, 170 12, 741 9, 279 10, 321 2, 738 7, 607 6, 530 5, 814 5, 416	0 258 310 7, 516 20 2, 634 1, 247 0 410 842 963 103 10 176	68, 059 43, 418 16, 028 17, 731 11, 296 10, 849 4, 918 7, 500 7, 401 5, 643 5, 986 2, 711	0 0 251 9, 333 41 1, 579 978 0 247 728 626	69, 888 31, 031 21, 620 16, 430 12, 715 9, 949 11, 2-3 6, 446 6, 349 6, 940 6, 892 4, 150 2, 969
Total	126, 843	2, 696, 113	125, 886	2, 465, 322	105, 541	2, 254, 639	100, 937	2, 241, 949

Bureau of Agricultural Economics. Official sources, except as otherwise noted.

Preliminary.
 International Yearbook of Agricultural Statistics.
 Year ended June 30.
 4-year average.

Table 326.—Beef, frozen, cured, and in process of cure: Stocks in cold-storage warehouses and meat-packing establishments, United States, 1922-1931

Kind and year	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	July 1	Aug. 1	Sept. 1	Oct. 1	Nov. 1	Dec. 1
1923	91, 805 82, 984	89, 272 79, 944 111, 947 55, 705 67, 431 50, 673 72, 117 72, 692	75, 604 76, 769 101, 599 51, 498 60, 659 44, 017 67, 486 69, 800	65, 292 68, 075 87, 684 43, 528 50, 945 87, 625 60, 664 64, 146	54, 522 52, 941 67, 271 32, 372 39, 712 28, 253 51, 442 57, 273	37, 548 41, 207 41, 784 46, 887 26, 649 28, 719 20, 654 39, 878 49, 913	31, 593 34, 385 37, 028 36, 452 23, 997 23, 261 17, 256 35, 759 46, 819	27, 727 24, 112 29, 435 26, 970 23, 509 18, 552 18, 896 31, 085 45, 830	28, 210 24, 625 29, 135 22, 879 21, 311 17, 241 17, 603 32, 122 42, 433	27, 590 28, 599 19, 755 25, 267 19, 456 22, 463 38, 996 43, 515	47, 929 43, 772 45, 857 27, 008 88, 079 26, 606 41, 635 51, 902 47, 221	71, 024 76, 731 50, 436 59, 603 45, 567 60, 189 70, 390 54, 894
in process of cure: 1922 1923 1924 1924 1925 1926 1927 1928 1930 1931	16, 313 24, 450 22, 593 28, 930 25, 146 28, 521 21, 979 21, 862 26, 653 19, 636	24, 841 22, 711 28, 758 24, 833 27, 823 20, 978 21, 873 26, 328	24, 987 23, 238 29, 210 26, 192 27, 361 19, 732 21, 285 25, 798	25, 210 25, 199 28, 634 27, 253 26, 214 19, 631 20, 943 24, 597	24, 013 25, 482 28, 952 27, 606 23, 216 17, 941 19, 272 23, 347	23, 816 24, 285 27, 731 25, 930 21, 694 16, 558 17, 437 21, 643	22, 835 22, 390 25, 102 24, 691 20, 405 14, 982 16, 296 20, 072	21, 781 20, 377 22, 704 22, 539 17, 170 13, 546 14, 845 18, 761	21, 416 19, 771 22, 335 20, 386 16, 205 13, 462	20, 597 18, 939 20, 964 20, 983 16, 422 14, 760 17, 438 16, 508	19, 649 21, 387 20, 473 23, 119 17, 220 16, 401 20, 157 16, 641	22, 142 23, 508 23, 128 26, 374 19, 778 19, 444 23, 054 18, 498

Bureau of Agricultural Economics. Compiled from reports made by cold-storage establishments.

Table 327.—Cattle-tick eradication: Progress and status of the work December 1, 1931

		ntined atles		used con Dec. 1, 19			d count		and di	inspected pped, year Dec.1,19311
State	July 1, 1906	Dec. 1, 1931	Tick free	With 1 or more infested herds	Total coun- ties re- leased	Nov. 1, 1929	Nov. 1, 1930	Nov. 1, 1931	Herds	Cattle
Alabama Arkansas California Florida Georgia Kontucky Louisiana Mississippi Missouri North Carolina Oklahoma South Carolina Tennessee Texas Virginia	67 75 15 67 158 2 64 82 4 73 61 46 42 198 31	0 8 0 25 0 42 0 0 0 0 52 0	67 55 15 41 158 2 17 77 4 73 61 48 42 113	0 12 0 1 0 5 5 0 0 0 0 0 33	67 67 15 42 158 2 22 22 4 73 61 40 42 146 31	63 45 15 30 155 2 3 3 55 4 73 60 46 42 94 30	64 53 15 33 168 2 100 78 4 70 61 46 42 116 31	67 55 15 41 158 2 17 77 4 73 61 46 42 113 30	56, 246 345, 647 0 104, 494 13, 168 0 59, 300 10, 206 2, 215 3, 051 0 602, 261	458, 433 1, 720, 724 0 1, 646, 547 127, 358 0 773, 051 91, 848 0 30, 927 23, 420 28, 283 0 10, 790, 719 2, 908
Total	985	127	801	57	858	717	783	801	1, 203, 921	15, 698, 196

Bureau of Animal Industry.

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<sup>1</sup> More than 13,000 dipping vats were in use for official dipping during the year,

Table 328.—Catile and calves: Shipments, slaughter, value of production, and income, by States, 1830

	Gross Value of production		1,000 1,000 and	64, 189 67, 593	28, 401 27, 063 28, 578 28, 763 47, 091 47, 243 22, 676 22, 728 37, 640 41, 418	159, 386 164, 204	45, 572 103, 194 105, 194 15, 014 15, 014 17, 014 18, 285 17, 130 17, 923 17, 923	397, 813 424, 224	557, 199 588, 428	3, 759 3, 894 11, 719 10, 582
	Receipts Gr from Inc		1,000 dollars dollars 1,548 1,548 1,456 1,476 1,476 2,24,267 2,4,267 2	61, 056 6	28, 853 22, 619 21, 340 37, 050	153, 881 15	42, 853 100, 988 14, 926 14, 926 14, 366 1, 366 80, 245 80, 245 80, 016	386, 375 39	539, 256   55	883 3, 670 11, 421
		on farms	1,000 dollars 50 520 103 103 1,176 1,176 1,348	3, 133	1, 548 1, 672 1, 336 1, 336	5, 505	2, 206 2, 206 1, 248 1, 312 2, 240 1, 872	12, 438	17, 943	25 119 298
	Calves	Total weight	1,000 pounds 1,875 1,750 1,750 600 8,736 7,750	22, 136	4, 480 5,000 12, 400 12, 875	41, 763	17, 160 6,000 4,000 8,100 3,600 7,500 5,250	61, 610	93, 373	135 540 1, 430
aughter	۳	Head	Thou- sanae 15 15 5 5 5 5 5 5 5 5 5 5	162	8888 183	264	2822283	88	407	-41
Farm slaughter	Cattle	Total weight	2, 400 2, 400 2, 400 3, 400 3, 900 2, 900 2, 900 2, 900	81, 100	26, 350 13, 175 14, 025 28, 000 10, 800	92, 350	31,540 15,500 15,500 15,480 21,680 28,400	148, 320	240, 670	8,3 460 250 250
	S.	Head	24 1 24 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	100	221123	112	*******	181	293	141
ments, feeding.	breeding, and dairy	Total welght	1,009 pounds 1,600 6,500 18,550 18,550 7,470 29,700 19,550 45,750	140,080	38,860 102,246 314,640 16,200 32,120	504, 065	130, 650 460, 280 303, 030 14, 000 87, 100 478, 380 509, 960	1, 983, 410	2, 487, 475	4,900
Inshi	breed d	Head	23 88 88 89 99 99 99 99 99 99 99 99 99 99	174	85224	709	195 687 481 20 130 714 836	3,063	3, 772	7 5
ighter	Calves	Total weight	1,000 Pounds ea 4,925 8,820 15,925 1,225 6,325 10,208 11,470 67,400	221, 640	73, 120 51, 000 64, 220 68, 900 124, 775	373, 015	90, 556 91, 950 10, 950 10, 950 10, 410 7, 505 7, 505	319, 861	692, 876	3, 510 16, 065 20, 620
local slau	ŭ	Head	77.02- 108 94 94 94 97 10 10 10 10 10 10 10 10 10 10 10 10 10	1, 574	457 340 458 1,085	2, 720	286 286 267 26 198 198	1,846	4, 586	8615
Shipments and local slaughter	Cattile	Total weight	1000 pounds 22, 600 17, 040 87, 460 8, 500 6, 500 198, 400 80, 800 80, 605	571, 535	243, 100 281, 700 713, 310 179, 025 374, 500	1, 791, 635	578, 350 1, 495, 500 755, 000 210, 420 463, 540 1, 219, 215 1, 315, 600	6, 032, 625	7, 824, 260	25, 400 123, 500 750
Shi	0	Head	22 22 23 24 45 25 25 25 25 25 25 25 25 25 25 25 25 25	670	286 217 217 376	1,959	1, 255 252 252 1, 283 1, 281	6, 577	8, 536	14083
	State and division		Maine. New Hampshine. Vermont. Massachusetts. Rhods Island. Connectient New York. New York. Peunsylvania.	North Atlantic	Ohlo. Indiana Illinois Wisconsin	North Central, East	Minnesota Iowa Missouri North Dakota South Dakota Kansasa	North Central, West	North Central	Delaware Maryland Virginia

North Carolina Bouth Carolina Georgia Fiorida	88 104 47	4,4,6,4,4 00,99,4 00,99,4 00,99,4	3883	7, 375 4, 500 15, 750 5, 520	19	9, 120 1, 400	88 88 21	10,800 17,280 5,700	4808	3, 125 1, 125 5, 700 805	370 87 346 83	3, 280 2, 028 2, 832 2, 047	3, 650 2, 116 5, 178 2, 130	4, 798 2, 043 5, 447 1, 573
South Atlantic	480	356, 095	637	92, 415	<b>88</b>	19, 505	100	59, 280	102	15, 485	1, 621	36, 389	38, 010	35, 980
Kentucky Trannessee Alabama. Missisappil Arkansas Loulsiana Oklahoma	225 188 188 1143 116 11, 132	185, 750 147, 740 147, 740 44, 633 71, 425 611, 620 894, 280	219 128 88 88 88 86 74 74 74	35, 30 17, 010 19, 900 9, 825 6, 825 47, 730 216, 720	20 20 20 321 212	21, 000 13, 300 18, 300 3, 500 216, 635 154, 780	8 9 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	6,7,1,7,000 11,25,000 11,5,20 11,5,20 19,500	85 21133355 85 21133355 86	8,4,4,4,980 8,875 8,800 8,900 8,000	323 292 305 184 287 467 630 1, 367	15, 904 10, 850 3, 688 4, 832 4, 268 4, 268 20, 921 62, 929	16, 227 11, 142 3, 993 5, 016 4, 555 4, 459 21, 451 64, 296	12, 989 11, 208 4, 139 6, 536 6, 536 7, 300 65, 737
South Central	2, 637	1, 989, 840	1,645	352, 535	620	420, 735	156	87, 210	88	54, 645	3, 745	127, 394	131, 139	137, 478
Montana. Idaho. Idaho. Wyoning Wyoning Colorado. New Mexico. Arizona Arizona Nowada. Nowada. Washington Cregon. Credifornia.	252 252 253 253 253 253 253 253 253 253	28, 200 116, 100 116, 100 286, 000 143, 136 28, 000 28, 000 28, 000 28, 000 28, 000 28, 000 28, 000	881281888 884888	8, 200 11, 200 22, 100 27, 100 27, 000 14, 200 18, 220 18, 220	27 210 210 135 88 88 16 7 7	38, 900 163, 860 163, 800 111, 250 111,	80002330448778	11 14,4,4,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	47.0 54.23 8 8 8 8 8	824-1448-1 546 8288 8288 8288 828 838 838 838 838 838	669 168 168 868 868 868 204 204 453 453 453 188 188 188 188 102 102 102	18, 871 17, 491 13, 836 13, 836 6, 388 6, 388 11, 330 30, 914	19, 23, 25, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20	
Western	2, 657	2, 270, 851	828	203, 105	947	695, 674	114	89, 131	193	40, 185	6, 182	141, 304	146, 486	160, 544
United States	14, 990	13, 0'2, 581	9, 180	1, 562, 571	5,548	3, 763, 469	763	557, 391	1, 153	225, 824	31, 624	902, 399	937, 023	990, 023

Bureau of Agricultural Economics. Estimates Division Crop and Livestock Estimates subject to revision. For 5-year average 1924–1928, see 1931 Yearbook Tables 370 and 371.
The figures on Income and value of production as shown in Table 456 are computed from the date shown in this table. The difference between gross income and value of production as shown in Table 456 are computed from the date shown the fact that in computing value of production allowance is made for changes in inventory numbers between the beginning and end of the year while in computing income these ears not used.

Table 329.—Hogs: Number on farms and value per head in the United States, 1840, 1850, 1860, 1867-1932

	Hogs o	n farms		Hogs o	n farms
Year	Number <sup>1</sup>	Value per head Jan. 1 <sup>2</sup>	Year	Number 1	Value pe head Jan. 1 8
1840 4	24, 894 24, 817 23, 316 25, 185 26, 781 29, 458 31, 796 32, 632 30, 861 28, 032 31, 766 47, 766 47, 766 44, 122 44, 131 46, 092 44, 517 56, 302 51, 603 50, 625 52, 388	Dollars	1900 <sup>3</sup> 1900 <sup>4</sup> 1900	52,000 54,600 57,300 61,300 67,000 68,188 40,300 55,700 54,000 55,700 51,200 56,700 61,200 68,848 69,848 69,848 69,848 66,576 66,864 66,576 66,864 66,576 56,203 56,203 56,203 56,334	Dollars  5.2 6.5 7.4 8.2 6.5 6.3 6.5 6.3 6.9 9.6 10.4 10.9 10.4 20.6 13.6 11.5 15.6 17.1 13.1 13.1 13.6 1.1 13.6

Bureau of Agricultural Economics. Estimates of the crop reporting board. Revisions for the years 1920-1931 were made January, 1932.

<sup>1</sup> Prior to 1900 estimates for each 10-year period represent an index of annual changes applied to census as base on first report after census data were available: 1900-1919 are tentative revised estimates of the Bureau of Agricultural Economics as first published in 1927 Yearbook.

2 Series for 1867-1899 are values of all hogs as reported.

2 Data for 1900-1925 are an old series for all hogs as reported, adjusted on basis average relationship between the new and the old series from 1922 to 1923. Old series was shown in 1928 Yearbook. Conversion factor was 1.057 (base was old series). Data for 1922-1923 are a new series, referred to above, of average values by age and sex classification weighted by numbers in each class.

4 Italic figures are from the census. Figures for census years 1830 and 1830 exclude estimate of unenumerated swine on ranges as follows: 1880, 2,033,970; 1890, 17,276. Census dates were June 1 from 1840 to 1900; Apr. 15, 1910, Jan. 1, 1920 and 1925; Apr. 1, 1930. 1900, 1910, and 1930 include spring-born pigs.

8 Original estimate of the Bureau of Agricultural Economics.

6 Preliminary.

Table 330.—Hogs, including pigs: Estimated number on farms and value per head, by States, January 1, 1928-1932

		1	Tumber		1		Valu	e per hea	d 1	
State and division	1928 3	1929 1	1930 2	1931 2	1932 3	1928	1929	1930	1931	1932
Maine	Thou- sands 70 29 56 97 5 24 341 80 792	Thou- sands 53 24 38 90 5 28 290 72 734	Thou-sands 49 18 30 97 5 24 232 72 683	Thou- sands 50 15 29 101 5 28 195 72 642	7 hou- sands 55 15 32 101 5 25 205 78 655	Dollars 15. 00 16. 10 14. 90 15. 30 18. 60 20. 20 15. 10 14. 90 14. 70	Dollars 14 80 13 60 16 00 18 00 18 80 14 20 15 70 13 90	Dollars 14, 80 15, 20 14, 60 16, 10 17, 60 17, 00 15, 40 16, 20 14, 40	Dollars 12. 90 13. 10 12. 00 14. 00 15. 40 15. 50 12. 40 13. 00 12. 40	Dollars 8, 70 8, 90 7, 50 8, 60 8, 00 9, 20 8, 70 10, 70 8, 50
North Atlantic.	1, 494	1, 334	1, 210	1, 135	1, 171	14.99	14 34	14. 95	12.71	8. 71
Ohio Indiana Illinois Michigan Wisconsin	2, 537 3, 227 5, 274 862 1, 720	2, 309 3, 066 4, 852 759 1, 534	2, 078 2, 637 4, 415 630 1, 422	1, 974 2, 637 4, 415 542 1, 536	2, 072 2, 900 4, 940 661 1, 658	12.50 13.00 18.70 12.40 12.90	11. 50 12. 30 13. 80 12. 20 14. 20	12. 40 12. 60 14. 80 12. 30 14. 30	10.00 10.70 12.60 10.50 12.50	6. 60 6. 90 6. 90 6. 90 5. 90
North Central, East	13, 620	12, 520	11, 182	11, 104	12, 231	13, 13	12 96	13. 63	11. 57	6.74
Minnesota Iowa Missouri North Dakota South Dakota Nebraska Kansas	3, 680 11, 124 4, 270 689 3, 000 5, 340 2, 531	3, 366 10, 244 4, 313 772 2, 700 5, 305 3, 006	3, 494 10, 200 3, 750 730 2, 800 5, 010 2, 828	3, 665 10, 509 3, 488 766 3, 000 4, 820 2, 487	3, 738 11, 350 4, 011 650 2, 490 5, 110 3, 109	15. 10 14. 40 11. 70 13. 80 15. 30 15. 50 13. 70	15. 70 15. 10 12 20 14. 50 15. 20 15. 00 12. 80	16. 30 16. 00 11. 40 14. 50 16. 00 15. 60 12. 80	13. 10 13. 40 8. 90 12. 40 13. 40 18. 40 10 50	6.30 6.30 5.70 5.40 5.40 5.90 5.50
North Central, West	30, 634	29, 706	28, 810	28, 735	30, 458	14 32	14. 49	15. 01	12. 53	5.98
North Central.	44, 254	42, 226	39, 992	39, 839	42, 689	13. 95		14 62	12. 26	6. 20
Delaware Maryland Virginia West Virginia North Carolina South Oarolina Georgia Florida		26 206 626 208 945 503 1,393 531	25 198 597 200 830 480 1, 312 519	23 168 508 168 838 504 1, 299 498	22 160 551 176 880 580 1, 390 508	11. 20 12. 80 12. 90 11. 20	11. 70 11. 70 9. 00 8 20	11, 70 10, 60 10, 00 10, 90 11, 60 9, 60 9, 70 7, 50	10. 80 9. 50 8. 00 8. 50 10. 20 8. 80 8. 40 6. 10	7. 50 6. 10 7. 50 7. 80 5. 60
South Atlantic.		4, 438	4, 161	4,006	4, 267	10. 73	9. 56	9. 93	8, 50	5.86
Kentucky Tennessee Alabama Mississippi Arkansas Louisiana Oklahoma	1, 040 1, 163 982 911 1, 041 527 1, 104 1, 800	988 1, 035 912 844 885 586 1, 215 1, 760	920 982 845 780 764 637 1, 053 1, 673	782 983 870 764 574 605 927 1,606	1, 205	10. 20 10. 40 8 90 8. 60 9. 20 11. 10	8. 60 9. 50 8. 70 8. 50 9. 70 9. 60	9. 70 10. 50 9. 30 8. 60 8. 80 9. 40	7.60 8.20 7.90 7.00 6.70 7.30 8.10 8.20	6.30 5.40 5.30 5.80 6.50 5.00
South Central.	8, 568	8, 225	7, 654	7, 061	8, 613	10. 18	9.15	9. 51	7.75	5. 75
Montana	509 - 509 - 67 - 23 - 90	300 285 150 550 65 25 74 23 214 230 650	280 245 130 495 65 21 70 20 173 195 590	777 18 183 205 560	351 123 624 74 23 96 21 3 238 6 26 6 672	12.90 13.50 13.10 10.40 13.10 11.50 12.30 14.10	11. 70 12. 50 12. 10 10. 70 13. 30 10. 20 12. 50 12. 50 12. 50 12. 50 12. 60	11.50 12.00 12.00 10.80 13.30 10.50 11.50 11.70 12.00	10. 90 10. 80 11. 10 9. 60 10. 30 9. 70 9. 90 11. 91 11. 11	5. 30 5. 00 5. 40 5. 20 5. 70 5. 90 5. 20 6. 70 6. 80 6. 20 6. 30
Western	_ 2, 669	2, 566	-		_			_	=	
United States	61, 772	58, 789	55, 301	54, 374	59, 511	13. 1	7 12.9	13. 46	3 11.8	6 6.14

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revisions by States, 1920–1927, are published in February, 1932, Crops and Markets.

<sup>&</sup>lt;sup>1</sup>Sum of total value of subgroups (classified by age and sex), divided by total number and rounded to nearest dime for States. Division and United States averages not rounded. State figures are new weighted value series not comparable to State figures previously published years prior to 1925.

<sup>2</sup> Revised, January, 1932.

<sup>3</sup> Preliminary.

Table 331.—Hogs: Numbers in countries having 150,000 and over, average 1921-1925, annual 1926-1931

Country	Month of estimate	Average 1921- 1925 1	1926	1927	1928	1929	1930	1981
North and Central America and West Indies: United States Canada	January June	Thou- sands 62,088 4,344 2 1,125	Thou- sands 52, 085	Thou- sands 55, 468 4, 695	Thou- sands 61, 772 4, 497	Thou- sands 58, 789 4, 382	Thou- sands 55, 301 4, 000	Thou- sands 54, 374
Τλέρνιση	do	2 1. 125	4, 360 2, 903	I		2,000		
Guatemala		1 57	1 02	70	89	72	79	
Salvador Cuba		(330)	}	·	-	·	335 591	
Dominican Repub-	May	(591) 866	/		-		. 091	
lic		1			1	1	1	
Haiti			170	185	200	220		
Estimated total	1	73,000						
		10,000						
South America:	l				ł	1		1
Colombia Venezuela		1, 352 512	1,400	1, 366	}	.}	1,484	
Ecuador		150				153		
Peru	February-April.	429				8 689		
Peru Bolivia Ohile		362	498	268		336		
Ohile		255					8 331	
Brazil Uruguay	September	3 5 16, 169 278		.		·	8 300	6 20, 000
Argentina	December 7	18 1, 437			·}		3,769	
_		2, 407					4 5, 700	
Estimated total 4_		21,000				·		
Europe:			-	<del></del>		<b></b>		
England and Wales	June	2,658	2,200	2, 692	2,971	2, 367	2,310	2,777
Isle of Man	do	7,54	3	1 4	7 4	3 8	4	
SCOURIG	lao	167	145	197	196	142	143	154
Northern Ireland	do	134	159	236	220	192	216	1 238
Irish Free State Norway 10	l do	947 216	884 303	1, 178 300	1, 183 283	945 289	1,052	1, 227 317
Sweden	do	1.058	003	1,369	200	209	339	317
Denmark	July	2.814	3, 122	8, 731	3, 363	3, 618	4,872	5, 473
Sweden Denmark Netherlands Belgium	July May-June December	2,314 1,519 1,081				l	3 11 1,684 4,872 2,018 1,237 6,102	1, 761 5, 473 6 2, 434 1, 250 6, 329
France	December	1,081	1, 152 5, 793	1, 144 5, 777	1, 124	1, 139 6, 017	1, 237	1, 250
Spain	do 7	5,302	5, 267	5.032	6,019	8 4 772	6, 102	6, 329
Spain Portugal	1	4,500 1,019	0, 201	0,000		8 4, 773		
11817	March-April	2,630 640	6 2, 850				8, 157	
SWITZERIANG	April December 7	1 640	637					8 924
Germany Austria	December '	15,776 1,399 2,201 2,424	16, 200	19, 424	22, 899	20, 106	19, 944 \$ 1, 965 \$ 13 3, 088 2, 362 (2, 800)	23, 365
Czechoslovakia	1	2 201	2, 539				8 13 2 000	9 7770
Czechoslovakia Hungary	April and July January December 7	2,424	2, 520	2, 387	2,662	2,582	2,362	2, 776 2, 715 2, 924
Yugoslavia Greece	January	2870	2, 520 2, 806	2, 387 2, 770	2,663	2, 582 2, 675	(2, 800)	2 924
Bulgaria	December 7	390	452	1 510	453	419	276	
Rumania	do 7	832 2, 976	3, 088	1,002	2, 987			
Poland	November	5.287	0,000	3, 168 6, 333	2, 801	2,684 94,829 944	2, 300 6, 047 1, 136	2,323 9 7,314
Lithuania	Spring	1, 521	1,441	1,010	1,060	944	1, 136	
Latvia Estonia	November Spring June July	465	521 333	535	535	6 382	023	712
Finland	September	299 378	333	354 418	327 435	279 426	290	
Russia, European	Summer	21, 184	20, 920	23, 202	26, 100	20, 500	18, 200	
Finland Russia, European and Asiatic <sup>13</sup>		,	-0,020		20, 100	20, 000	10, 200	
Estimated total		21 100	<del> </del>					
excluding Rus-		61, 100						
sia 4			1					
A <del>del</del> co a								
Africa: Union of South	A medit. A manuak	000	000					
Africa	April-August	888	932	870	857	820		
Madagascar	February	369	386	335	328	412	531	
Working to distant							- 001	
Estimated total 4_		2, 200						
Asia:	l							
China (including Turkestan and Manchuria)		14 62, 500						
Mancharia and		,						
Japan	December 7	590	, alexa					
Chosen	do 7	1,078	673 1, 150	621 1, 221	677 1, 244	764	706 1, 328	
Taiwan	- do	1,302 2,767	1,435 2,361	1,543	1, 643	1, 277 1, 718 2, 782	1, 828	1, 387
French-Indo China		2,767	2, 361	1, 543 2, 361	1, 643 2, 621	2,782	8, 049	
See footnotes at end of	table.						-, - 40 4	

Table 331.—Hogs: Numbers in countries having 150,000 and over, average 1921-1925, annual 1926-1931—Continued

Country	Month of estimate	Average 1921– 1925 1	1926	1927	1928	1929	1930	1931
Asia—Continued. Siam		Thou- sands 864 220 5, 768 783	Thou- sands 8,885	Thou- sands 9, 298 833	Thou- sands 9, 798	Thou- sands	Thou- sands	Thou- sands
Estimated total excluding Rus- sia <sup>4</sup>		76, 400						
Oceania: Australia New Zealand	December 7 January	918 396	1, 128 473	989 520	878 587	910 557	1, 018 488	
Estimated total 4.		1, 400						
Total countries reporting all periods, including Russia: To 1930 (28) 15. To 1931 (15) 15 if Estimated world total including Russia 4		. 134, 642 100, 501 256, 300	128, 185 02, 128	136, 442 100, 228	149, 394 110, 130	138, 948 103, 204	127, 360 100, 829	105, 563

Bureau of Agricultural Economics. Official estimates and International Institute of Agriculture unless otherwise stated.

8 Census figure 4 These totals include interpolations for a few countries not reporting each year, and rough estimates for some others.

§ Year 1930.

§ Unofficial.

- <sup>7</sup> Estimates reported as of December have been considered as of Jan. 1 of the following year; i. e., the figure for the number of swine in France as of Dec. 31, 1025, has been put in the 1926 column.

  <sup>8</sup> Year 1922.

Year 1922.

9 June.

10 Number in rural communities.

11 September.

12 May.

13 Year 1916, from the Soviet Union Review, April, 1923, p. 52. Years 1924–1925, Statistical Review, October, 1928; 1926 Controlling Figures for National Economy of the U. S. S. R. 1929–1930; year, 1927, Agricultural Statistics of the U. S. S. R., Lenin Academy, 1928–30; Planned Economy No. 12, 1930 State Planning Board.

14 Estimates for all China based on official estimate for 1920 in 20 provinces which supported over 50 per 14 Estimates for all China in 1914. Figuring Board.

14 Estimates for all China based on official estimate for 1920 in 20 provinces which supported over 50 per cent of the total in China in 1914.

15 Comparable totals for the number of countries indicated,

16 Excluding Russia.

TABLE 332 .- Hogs: Receipts at all public stockyards, 1922-1931

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1922 1923 1924 1925 1926 1927 1928 1929 1930 1931	Thou- sands 4, 278 5, 306 6, 253 6, 105 4, 304 4, 252 5, 306 5, 133 4, 720 4, 652	Thou-sands 3, 613 4, 492 5, 335 4, 558 3, 372 3, 308 5, 267 4, 000 3, 781 3, 704	Thou- sands 3, 411 4, 927 4, 833 3, 528 3, 579 3, 754 4, 639 3, 436 3, 294 3, 207	Thou- sands 3, 067 4, 318 4, 374 3, 135 3, 142 3, 483 3, 582 3, 255 3, 067	Thou-sands 3, 737 4, 524 4, 321 3, 283 3, 037 8, 613 3, 723 3, 431 3, 293 2, 938	Thou-sands 3, 776 4, 204 4, 296 3, 507 3, 143 3, 775 3, 548 3, 275 3, 215 2, 854	Thou-sands 2, 980 4, 181 4, 091 2, 798 2, 854 8, 046 2, 924 3, 297 2, 918 2, 511	Thou-sands 3, 037 8, 714 3, 197 2, 549 2, 804 3, 042 2, 523 2, 964 2, 617 2, 454	Thou-sands 3, 062 8, 607 8, 216 2, 741 2, 819 2, 565 2, 600 3, 089 2, 799 2, 727	Thou-sands 3, 682 4, 816 3, 990 3, 390 3, 261 3, 039 3, 666 3, 701 3, 441 3, 462	Thou-sands 4, 421 5, 416 4, 904 3, 843 3, 554 3, 666 4, 075 3, 933 3, 439 3, 752	Thou-sands 5,004 5,825 6,604 4,380 3,910 4,209 4,778 4,256 4,002 4,210	Thou-sands 44, 068 55, 330 55, 414 43, 929 39, 772 41, 411 46, 527 44, 097 40, 774 39, 538

Bureau of Agricultural Economics. Compiled from data of the livestock and meat reporting service of the bureau. Earlier data in 1930 Yearbook, p. 850, Table 376.

<sup>1</sup> Average for 5-year period if available, otherwise for any year or years within that period unless otherwise stated.
Incomplete.

Table 333.—Hogs: Receipts at principal public stockyards and all public stockyards, 1922-1931

Year	Chi- cago	Den- ver	East St. Louis	Fort Worth	Kan- sas City	Oma- ha	St. Joseph	South St. Paul	Sioux City	Total 9 mar- kets <sup>1</sup>	All other stock- yards report- ing	Total all stock- yards re- port- ing <sup>1</sup>
1922 1928 1924 1925 1926 1927 1928 1930 1930	Thou- sands 8, 156 10, 460 10, 443 7, 996 7, 724 8, 539 8, 193 7, 870 7, 942	Thon-sands 395 495 569 467 497 457 567 539 512 597	Thou- sands 3, 606 4, 831 4, 580 3, 512 3, 536 3, 710 4, 036 3, 865 8, 459 2, 970	Thou- sands 510 456 392 312 217 338 432 402 279 216	Thou-sands 2,655 3,615 2,933 2,067 2,036 1,904 2,391 2,476 2,016 1,337	Thou-sands 2, 839 3, 649 3, 978 3, 355 2, 647 2, 631 3, 179 3, 166 3, 363 3, 525	Thou- sands 2, 061 2, 457 2, 234 1, 673 1, 462 1, 425 1, 724 1, 627 1, 446 1, 322	Thou- sands 2, 523 3, 338 3, 751 3, 637 3, 451 3, 105 2, 902 2, 869 2, 759 3, 251	Thou-sands 1, 856 2, 989 3, 732 3, 396 2, 475 2, 322 2, 754 2, 313 2, 646	Thou-sands 24, 601 32, 321 32, 613 26, 415 23, 413 23, 616 26, 525 25, 450 24, 021 23, 805	Thou-sands 19, 467 23, 009 22, 801 17, 514 16, 359 17, 795 20, 002 18, 647 16, 753 15, 733	Thou- sands 44,068 55,330 55,414 43,929 39,772 41,411 46,527 44,097 40,774 39,538

Bureau of Agricultural Economics. Compiled from data of the livestock and meat reporting service of the bureau. Receipts, 1900-1920, are available in 1924 Yearbook, p. 902, Table 500.

TABLE 334.—Hogs: Monthly average live weight, Chicago, 1922-23 to 1931-32

Year beginning October	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Aver- age Oct Mar. <sup>1</sup>	Apr.	Мау	June	July	Aug.	Sept.	Aver- age Apr Sept. <sup>1</sup>
1922-23 1923-24 1924-25 1925-26 1926-27 1927-28 1928-29 1929-30 1930-31 1931-32	Lbs. 243 247 235 242 232 235 247 242 227 222	Lbs. 231 234 220 228 217 215 238 223 221 217	Lbs. 234 231 214 225 220 217 231 224 226 228	Lbs. 239 227 220 231 226 225 228 228 235	Lbs, 241 229 222 235 229 230 230 231 237	Lbs. 247 237 229 245 240 235 238 235 242	Lbs. 239 234 223 234 227 226 235 230 231	Lbs. 249 239 235 244 239 233 241 234 240	Lbs. 242 239 236 247 243 234 239 238 240	Lbs. 242 241 238 255 248 239 247 245 251	Lbs. 250 251 249 271 257 251 257 258	Lbs, 253 255 256 281 265 257 265 257 255 256	Lbs. 254 254 253 267 261 251 259 244 240	Lbs. 248 246 244 261 252 244 251 246 248

Bureau of Agricultural Economics. Livestock and meat reporting service. Weighted average of packer and shipper purchases. Data for 1900–1922 are available in 1924 Yearbook, p. 909, Table 506.

TABLE 335.—Hogs: Estimated average price per 100 pounds received by producers in the United States, 1922-23 to 1931-32

Year beginning October	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	Мау 15	June 15	July 15	Aug. 15	Sept.	Weight- ed aver- age
1926-27					11.76 11.19 7.62	11.65 10.89 7.48		Dol- lars 7. 13 6. 68 10. 78 11. 97 9. 41 8. 82 9. 96 8. 99 6. 35	12.80 8.40 8.70	12. 69 8. 58 9. 64		Dol- lars 7.81 8.50 11.50 12.07 9.78 11.17 9.58 9.44 5.44	Dol- lars 7. 41 6. 85 10. 15 11. 55 10. 28 8. 59 9. 28 8. 95 6. 95

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by number of hogs Jan. 1, to obtain a price for the United States; yearly price obtained by weighting monthly prices by Federal inspected slaughter. For previous data see 1931 or earlier Yearbooks.

<sup>1</sup> Rounded totals of complete figures.

<sup>&</sup>lt;sup>1</sup> Simple average.

Table 336.—Hogs: Average price per 100 pounds at Chicago, by months, 1901-1931

Year be- ginning October	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aug.	Sept.	Simple aver- age
1901	Dolls. 6.10 7.00 5.55 40 6.15 5.95 6.46 5.75 8.20 7.90 9.7.15 14.17 7.70 14.35 12.0 39.57 9.38 9.34 5.00	Dolla: 5.65 6.30 4.65 6.30 4.85 6.4 80 6.80 6.80 7.75 7.75 7.75 6.65 9.60 17.40 11.83 7.11.28 8.83 9.65 8.85 4.61	Dolls. 5.95 6.20 4.450 4.90 6.470 5.65 7.65 6.40 7.70 6.40 9.95 16.85 17.55 13.60 19.35 10.97 11.57 8.61 9.39 4.20	Dolls. 6. 20 6. 40 4. 90 6. 40 6. 60 6. 60 6. 60 6. 25 6. 25 6. 25 6. 25 6. 25 6. 25 6. 25 6. 25 6. 25 6. 20 10. 90 7. 20 11. 90 14. 30 7. 10 10. 38 12. 02 11. 96 8. 22 9. 78 6. 7. 65	Dolls. 6, 10 6, 15 5, 15 5, 15 6, 00 7, 05 7, 40 6, 20 8, 15 16, 85 17, 65 11, 73 8, 00 12, 45 11, 73 8, 00 12, 45 11, 73 8, 00 12, 45 11, 73 8, 00 12, 45 17, 7, 06 11, 73 8, 00 12, 45 17, 7, 06 12, 45 17, 7, 06 12, 45 17, 7, 06 12, 45 17, 7, 06 12, 45 17, 7, 06 12, 45 17, 7, 06 12, 45 17, 7, 06 12, 45 17, 7, 06 12, 45 17, 7, 06 12, 45 17, 7, 06 12, 45 17, 7, 06 12, 45 17, 7, 06 12, 45 17, 7, 06 12, 45 17, 7, 06 12, 45 17, 7, 06 12, 45 17, 7, 06 12, 45 17, 7, 06 12, 45 17, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10	Dolls. 6.35 7.30 5.35 7.30 6.30 6.75 6.85 7.10 10.55 6.85 7.10 10.10 11.20 11.20 11.28 8.18 8.08 11.44 10.17 7.48	Dolls. 6. 95 7. 20 5. 10 5. 145 6. 55 6. 65 5. 85 7. 20 9. 75 15. 75 20, 40 14. 75 12. 33 10. 69 9. 23 11. 41 10. 09 7. 20	Dolls. 7.00 6.45 4.65 6.40 6.45 6.40 6.45 6.90 7.30 8.55 8.00 7.85 8.55 8.00 17.45 15.90 17.45 10.48 7.34 12.06 13.55 9.59 10.81 10.63	Dolle. 7. 35 6. 00 5. 05 6. 55 6. 15 6. 55 6. 16 7. 65 8. 20 7. 65 8. 20 9. 70 15. 50 16. 60 20. 40 14. 01 8. 19 10. 33 6. 92 7. 04 12. 57 14. 01 8. 78 9. 91 10. 72 9. 52 6. 36	Dolls. 7.65. 5.55. 6.65. 6.65. 6.50. 7.85. 8.70. 7.65. 9.06. 8.70. 7.65. 9.06. 11.20. 12.51. 9.05. 11.20. 8.73. 6.33.	Dolls. 7.15 5.45 6.25 6.26 6.00 6.55 7.75 8.35 7.30 8.25 8.35 9.00 10.30 16.90 10.40 11.48 9.26 11.48 9.03 11.52 9.58	Dolls. 7.55 5.85 5.75 6.00 6.25 6.00 6.85 8.20 8.85 7.25 10.70 18.20 19.65 17.45 15.88 7.25 10.70 11.20 11.89 11.89 11.89 11.80 11.8	9. 58 10. 20 9. 67

Bureau of Agricultural Economics. Monthly figures prior to 1920 are general average hog prices as published in the Chicago Drovers Journal Yearbook; subsequent figures compiled from reports of packer and shipper purchases; such purchases do not include pigs, boars, stags, extremely rough sows, or cripples. The yearly figures are the simple average of the October to September prices.

TABLE 337 .- Hogs: Slaughter 1 under Federal inspection by months, 1922-1931

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1922	Thou- sands 3, 985 5, 134 5, 911 5, 979 4, 501 4, 514 5, 479 5, 738 5, 901 5, 362	Thou- sands 3, 480 4, 231 5, 008 4, 147 3, 351 5, 780 4, 478 4, 034 4, 142	Thou- sands 3, 350 4, 838 4, 536 3, 502 3, 502 3, 512 3, 533 3, 523	Thousands 2, 146 4, 179 4, 073 3, 037 3, 105 3, 330 3, 440 3, 761 3, 488 3, 488	Thousands 3, 716 4, 325 4, 278 3, 186 3, 131 3, 766 3, 884 3, 798 3, 823 3, 408	Thou- sands 4, 046 4, 303 4, 288 3, 732 3, 430 4, 253 4, 278 3, 689 3, 251	Thousands 3, 104 833 4, 114 2, 819 3, 421 27 3, 481 45, 597 8, 187 2, 767	Thou- sands 2, 888 3, 558 3, 070 2, 453 2, 834 3, 050 2, 545 3, 130 2, 724 2, 500	Thou-sands 2,747 3,212 2,857 2,598 2,618 2,534 2,773 2,955	Thou-sands 3, 332 4, 328 3, 498 3, 314 2, 976 2, 9713 3, 857 3, 402 3, 772	Thou- sands 4, 318 5, 341 4, 641 3, 646 3, 610 4, 455 4, 455 4, 409 4, 024 4, 218	Thou-sands 5, 201 5, 904 6, 600 4, 533 4, 389 5, 782 5, 083 4, 647 5, 387	Thou- sands 43, 114 53, 334 52, 873 43, 043 40, 636 43, 633 49, 795 48, 445 44, 206 44, 772

Bureau of Animal Industry.

<sup>1</sup> The figures include condemned carcasses.

Table 338.—Hogs: Average price per 100 pounds at Chicago and Omaha, by months, July, 1930-December, 1931

## CHICAGO

		Butcher	, bacon,	and ship	per hogs	1			
	Light	weight	Mediur	n weight	Heavy	weight	(275-500		
Year and month	160-180 pounds Good and Choice	180-200 pounds Good and Choice	200-220 pounds Good and Choice	220-250 pounds Good and Choice	250-290 pounds Good and Choice	290–350 pounds Good and Choice	(275–500 lbs.), Medi- um and Good	and shipper hogs	
July	Dollars 9, 55	Dollars 9, 53	Dollars 9, 46	Dollars 9, 29	Dollars 9. 07	Dollars 8.82	Dollars	Dollars 8, 73	
August September	1 10 58	10. 62 10. 68	10. 56 10 80	10.42 10.84	10. 14 10. 76	9. 78 10. 47	8. 35	9. 58 9. 76	
October	9 53	9, 63	9.72	9.81	9, 83	9. 72	8.28	9.34	
November.	8.56	8 57	8.60	8.66	8. 67	8.60	7.71	8, 55	
December	8 16	8 13	8 06	7.97	7.89	7.78	7.02	7. 92	
Average, 6 months	9 47	9. 53	9. 53	9. 50	9 39	9. 20	7.95	8. 91	
1931									
January	8 11	8.08	7.94	7.70	7.44	7. 22		7, 65	
February	7.66	7.64	7.46	7. 14	6.81	6. 58		7.06	
March April	7.94 7.78	7. 94 7. 78	7.86 7.65	7.63 7.44	7. 36 7. 16	7. 10		7.46	
May	6.90	6.89	6.85	6.70	6.49	6.89 6.23	6. 22	7. 26	
June	6.86	6.89	6.89	6.82	6.62	6.27		6. 53 6. 36	
July	7.53	7.63	7.61	7.85	6.81	6.08		6, 33	
August	7.24	7.32	7.27	7.04	6.61	5. 97		5.98	
September	5.80	5. 96	6.05	6.02	5.88	5. 49	4.65	5, 41	
October November	5.01	5. 12	5. 26	5. 35	5.37	5. 30		5, 09	
December	4.63 4.29	4.67 4.32	4.69 4.31	4.70	4.69 4.22	4.64		4, 61	
							0.09	4. 20	
Average	6.64	6.68	6.65	6. 51	6. 29	5. 99	5. 26	6. 16	

## AHAMO

1930 July August. September October November December	9, 96 9, 80 8, 92 8, 04	Dollars 8. 93 10. 04 10. 09 9. 19 8. 18 7. 78	Dollars 8, 94 10, 04 10, 28 9, 31 8, 27 7, 78	Dollars 8. 83 9. 90 10. 26 9. 30 8. 28 7. 75	Dollars 8. 61 9. 60 10. 10 9. 23 8. 28 7. 70	Dollars 8. 89 9. 14 9. 65 8. 99 8. 10 7. 55	Dollars 7.44 8.15 8.21 7.88 7.40 6.72	Dollars 8. 27 8. 87 9. 08 8. 80 8. 13 7. 66
Average, 6 months	8.90	9.04	9. 10	9. 05	8.92	8.04	7.61	8.42
January  Rebruary  March April  May June July August  September October November December	7.09 7.31 7.20 6.38 6.46 7.03 6.65 5.43 4.75 4.31 3.87	7. 62 7. 05 7. 34 7. 21 6. 38 6. 48 7. 03 6. 66 5. 56 4. 92 4. 39 3. 93	7. 54 6. 92 7. 33 7. 17 6. 34 6. 34 6. 62 5. 56 4. 94 4. 41 3. 92	7. 40 6. 70 7. 21 7. 03 6. 19 6. 35 6. 35 6. 25 5. 50 4. 94 4. 40 3. 91	7. 20 6. 46 7. 05 6. 82 5. 95 6. 08 6. 00 5. 55 5. 12 4. 88 4. 39 3. 88	6. 99 6. 22 6. 84 6. 56 5. 65 5. 80 5. 50 5. 11 4. 70 4. 74 4. 38 3. 86	6. 17 5. 58 6. 14 5. 94 4. 97 5. 06 4. 79 4. 56 4. 10 4. 32 4. 06 3. 55	7. 33 6. 58 7. 02 6. 80 5. 93 5. 98 5. 81 5. 20 4. 77 4. 05 4. 20 3. 84
Average	6. 18	6. 21	6. 19	6.04	5.78	5. 58	4.94	5.73

Bureau of Agricultural Economics. Compiled from data of the livestock and meat-producing service of the bureau. Earlier data in 1927 Yearbook, pp. 1012-1014 and in 1931 Yearbook, p. 852.

Table 339 .- Hogs: Slaughter in specified countries, 1921-1931

Year	United States, Federal Inspected	Canada, total	Germany, inspected slaughter	Denmark, in export slaughter houses	England and Wales, sold off farms for slaughter <sup>1</sup>	Scotland, sold off farms for slaughter <sup>1</sup>	Ireland, purchased by Irish bacon cureis	Nether- lands, 1e- celpts at 21 mar- kets
1921 1922 1923 1924 1924 1925 1928 1928 1929 1929 1930	Thousands 38, 982 43, 114 53, 334 52, 873 43, 043 40, 636 43, 633 40, 795 48, 445 44, 266 44, 772	Thousands 5, 297 5, 382 6, 056 6, 625 5, 720 5, 636 5, 965 5, 880 5, 747 5, 248	Thousands 6, 825 6, 923 5, 830 10, 527 12, 090 13, 072 17, 279 19, 391 17, 252 17, 994 20, 488	Thousands 1, 641 2, 215 3, 414 4, 024 3, 766 3, 838 5, 098 5, 373 4, 994 6, 132 7, 343	Thousands 3, 471 3, 229 3, 601 4, 500 3, 588 3, 074 3, 680 4, 109 3, 214 3, 219	Thousands 173 176 245 242	Thousands 1, 030 926 955 1, 110 911 910 1, 050 1, 264 1, 142 1, 037 1, 102	Thousands 1, 362 865 906 1, 008 1, 045 1, 025 1, 151 1, 068 1, 046

Bureau of Agricultural Economics. ('ompiled from official sources and cabled reports from agricultural representatives abroad.

Table 340.—Lard and pork: Stocks in cold-storage warehouses and meat-packing establishments, United States, 1922-1931 1

				,			,	70-100	-			
Product and year	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	July 1	Aug. 1	Sept. 1	Oct. 1	Nov. 1	Dec. 1
	1.000	1.000	1.000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1.000	1 000
Lard:		pounds		nounds	pounds	nounds	nounds	nounde	mounde	nounde	mounde	1,000
1922	47, 541	61, 202	61, 297	86 031	98, 055	23 798	154 254	143 084	119, 755	75 332	28 750	32, 508
1923	48, 808	56, 266		66, 743	85, 251	84, 530	123, 896	143, 579	115, 860	72 608	35, 225	
1924	49, 340	54, 130	68, 610	1 85, 722	1102, 317	1127, 949	152, 520	1149, 672	124 676	84 198	31 708	
1925	61, 049	112, 704	151, 927	150, 182	151, 499	138, 295	145, 919	145, 924	114 724	71, 828	37, 256	
1926	42, 478	64, 187	76, 145	l 93. 108	1 98. 365	106, 824	120, 527	1153, 572	151, 233	105 559	72 355	
1927	1 49, 992	1 60, 576	77.103	I 02 080	1 90 R11	1111 Q7R	147 319	170 128	187 010	110 174	79 191	
1928	04, 800	81,007	121, 082	1164, 506	1173, 088	1186, 073	214, 479	1204, 939	177, 888	126, 890	l 83.474	
1929	85, 217	1140, 520	173, 864	1179, 428	1184, 748	1183, 490	(199, 690	1203. 010	:180, 085	153, 690	99, 845	68, 517
1930	82, 098	92, 171	111,914	105, 067	104, 905	115, 270	120, 322	118, 353	88, 868	59, 732	36, 211	31, 582
1931	51, 434	62, 624	74, 977	78, 249	95, 693	103, 366	115, 561	121, 926	96, 047	69, 296	39, 766	34, 824
Dry salt cured		1	1	1		1		1	{	{	1	,
and in proc-	l	1	1	İ		}	l	ł	Į.			1
ess of cure:												
1922	1111, 071	128, 690	139, 281	145, 183	142, 030	157, 689	186, 948	179, 856	165, 668	122, 783	85, 671	83, 017
1923	121, 125	155, 922	178, 024	206, 429	227, 728	214, 453	217, 862	221, 716	191, 711	146, 974	108, 850	110, 824
1924	148, 121	167, 507	178, 258	192, 934	191, 882	206,009	212, 158	202, 618	180, 127	135, 702	81,460	78, 871
1925	118, 718	136, 125	100, 819	142, 900	140, 098	192, 202	102, 018	103, 374	102, 555	128, 098	106,011	96, 746
	119, 017	138, 005	101 750	101, 286	190, 324	100, 801	120, 102	108, 882	172, 766	143, 072	98, 521	66, 765
1927 1928	07, 203	86, 135	101, 100	124, 070	120, 037	143, 143	173, 200	180, 920	178, 107	140, 420	100, 922	77, 240
	149 011	119, 751 167, 561	170,009	170, 012	108 800	109,003	149, 900	109, 473	100, 402	120, 898	101, 128	102, 440
1930	107 701	116, 288	199 740	115 000	110,000	108 010	100, 000	114,000	100, 018	109, 200	111, 002	88, 782
1931	70 100	108, 394	120, 720	141 998	147 005	148 689	154 040	184 505	152 507	110 100	70 459	48, 931
Pickled, cured,	10, 100	100,002	-40, 410	131, 200	121,000	420,002	102, 020	100, 000	100,007	110, 100	10,200	63, 121
and in proc-	l	ł		1	ì	1			ì		ł	l
ess of cure:	ì	1	1	1						1	1	
1922	252, 822	284, 487	321, 950	347, 270	348, 305	363, 395	391 474	385, 692	369 187	313 517	278 812	202 702
1923	377, 107	284, 487 412, 806	451, 279	469, 130	499, 119	483, 673	473, 560	449 441	413, 798	367, 374	325 456	384 604
1924	434, 030	468, 892	500, 784	512 190	500, 683	483, 372	473, 914	443, 918	408, 928	351, 485	283, 710	200 888
1925	398, 521	443, 025	483, 302	468, 099	467, 395	425, 481	407, 610	373, 227	338, 158	284, 485	256, 684	261, 128
1926	294, 642	443, 025 310, 726	345, 681	346, 049	338, 905	320, 305	333, 305	340, 687	330, 326	293, 106	257, 728	266, 222
1927	306, 904	352, 081	392, 642	420, 037	435, 967	432, 965	450, 172	440, 744	407, 239	341, 460	289, 553	276, 916
1928	320, 430	370, 916	461, 264	496, 322	1480, 069	459, 878	454, 826	408, 994	351, 936	285, 300	1265, 988	292, 626
1929	375, 217	424, 921	473, 916	453, 612	452, 868	443, 044	430, 317	412, 649	382, 750	342, 038	304, 400	316, 180
		392, 123										
_ 1931	328, 010	402, 448	453, 042	431, 926	453, 038	434, 324	403, 908	362, 423	311, 985	277, 148	247, 986	264, 205
Frozen:												
1922	51, 203	71, 722	86, 219	98, 765	103, 907	114, 571	128, 962	117, 903	84, 815	46, 796		
1923		120, 198										
1924	120, 718	164, 491	199, 044	227, 284	210, 767	201, 728	186, 566	104, 049	121, 816	77, 986	42, 561	
1925 1926	120, 120	199, 642	201, 204	Z18, 008	201, 240	100,045	100, 027	131, 935	10,078	04, 294	29,910	
	07, 900	98, 311	177 070	109, 209	127, 009	111,300	200, 707	100, 104	119, 992	77, 673	49, 376	
1927	105 050	150, 255	204 040	193, 733	201, 008	211, 742	00 K 000	219,007	179 617	100, 887	76, 644	
	181 011	164, 971	201, 053	020, 903	1000, 80L	200,020	047 015	290, 714	170 191	110 004	66,049	
1930	145 075	245, 798 178, 695	217 049	208 417	190 600	178 QE1	174 940	157 107	104 640	02 301	75, 910 64, 127	
1931	122 004	215, 422	271 088	270 520	266 401	244 745	215 704	180 882	120 571	81 550	53, 456	
4774		1-10, 200	, 000	-10,000	200, 201	- xx, 120	-10, 107	1-00,000	A0, 011	34,000	300, 200	30, 231

Bureau of Agricultural Economics. Compiled from reports made by cold-storage establishments.

<sup>1</sup> For years ended May 31 following. 2 Inspected slaughter, only, was estimated at 2,234,000 in 1931 compared with 2,194,000 in 1930.

Lard includes all prime steam, kettle-rendered, neutral, and other pure lards. It does not include lard substitutes nor compounds.
 Pickled pork includes sweet-pickled, plain-brine, and barreled pork.

Table 341.—Pork and pork products: International trade, average 1925-1929, annual 1928-1930

				Calend	lar year			
Country	Average	1925-1929	19	)28	19	29	193	30 1
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES  United States Denmark Netherlands Irish Free State Canada Sweden Poland Hungary New Zealand Ohina Argentina Australia 2	249, 396 92, 656 90, 757 41, 205 40, 987 26, 512 13, 177 12, 824 9, 319 3, 374	15, 089 55, 011 17, 247 9, 796 37, 151 84 35 413 42 2, 119	274, 177 115, 957 53, 357 51, 426 46, 987 10, 605 18, 893 10, 089	2,713 16,623 48,509 15,227 6,863 57,292 85 6 442 40 3,181	1,000 pownds 1, 208, 089 596, 417 202, 634 40, 462 44, 603 21, 962 14, 074 19, 788 12, 020 13, 456 3, 219 2, 272, 588	7, 894 44, 420 3 5 343 32 3, 115	738, 218 210, 205 81, 312 20, 651 63, 960 17, 124 21, 834 16, 846 10, 586	2, 784 5, 225 55, 661 21, 398 6, 591 30, 805 0 2 278 31 829
PRINCIPAL IMPORTING COUNTRIES	_							
United Kingdom Germany Cuba France Czechoślovakia Mexico Anstria Belgium Italy Finland Peru Norway Philippine Islands Switzerland Brazil Spain Union of South Africa Chile	3, 135 4, 018 7, 184 3, 212 379 6 17 0 188 940 1, 803 747 3 199	1, 371, 807 322, 127 130, 313 88, 997 45, 127 38, 382 22, 999 16, 850 11, 692 8, 285 7, 915 6, 765 2, 589 4, 738	4, 832 3, 229 3, 263 8, 404 6, 810 1, 108 181 0 4 0 37 1, 928 617 94	130, 418 101, 821 71, 629 63, 841 31, 093 10, 935 30, 147 13, 865 9, 405 8, 298 7, 359 6, 496 8, 561 1, 476	6, 159 0 1, 739 4, 802 280 3, 932 1, 179 330 10 58 0 0 30 1, 608 892 635 437	1, 306, 908 275, 581 123, 812 57, 806 84, 792 676 30, 304 36, 807 28, 812 11, 362 11, 362 4, 479 4, 482 11, 482 11, 482 11, 482 11, 482 11, 482 11, 482	0 1, 602 2, 573 5 316 3, 087 2, 059 751	60, 435 77, 390 23, 337 34, 592 11, 055 7, 271 3, 817 6, 810 4, 913 888
Total	32, 982	2, 163, 324	29, 532	2, 172, 953	27, 523	2, 093, 663	34, 532	2, 128, 210

Bureau of Agricultural Economics. Official sources except where otherwise noted. These figures comprise: Pork fresh, canned, pickled, smoked, bacon, Cumberland sides, Wiltshire sides, hams and shoulders, lard, lard compound, neutral lard, hog casings, lard oil, heads and feet.

<sup>&</sup>lt;sup>1</sup> Preliminary.

<sup>&</sup>lt;sup>2</sup> Year ended June 30.

<sup>4-</sup>year average.

Table 342.—Lard: International trade, average 1925-1929, annual 1927-1930

!					Calenda	ar year				
Country	Average 1925- 1920		19	27	19	28	19	29	193	D 1
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Im- ports
PEINCIPAL EXPORTING COUNTRIES United States Netherlands Denmark China Hungary Canada Irish Free State Madagascar Australia 2	9,618	1,000 pounds 0 6,748 1,383 0 15 1,462 699 2 413	1,000 pounds 681, 303 74, 652 29, 213 8, 659 9, 932 4, 845 3, 921 1, 180 1, 316		1,000 pounds 750, 722 65, 244 30, 851 8, 229 3, 785 1, 003 4, 491 2, 140 1, 360	1,000 pounds 0 11, 619 1, 315 0 69 1, 183 625 6 712	1,000 pounds 829, 329 49, 112 28, 434 9, 880 2, 863 1, 504 1, 353 1, 599	1,000 pounds 0 4,727 1,258 0 0 297 879 1 421	1,000 pounds 642, 486 39, 619 38, 102 8, 458 9, 183 175 6, 170 1, 514	1,000 pounds 0 2,831 1,376 0 1,656 2,198 0 206
Total	853, 986	10, 722	815, 021	13, 205	876, 825	15, 529	927, 868	7, 583	746, 677	8, 267
PRINCIPAL IMPORTING COUNTRIES										
United Kingdom Germany Cuba Ozechoslovakia Austria France Poland Belgium Peru Italy Finland Switzorland Dominican Republic Philippine Islands British Malaya Swedon Brazil Norway Yugoslavia	857 0 52 500 47 2, 205 6 820 54 21 0 0 1, 151 1, 327	267, 191 216, 643 87, 352 36, 159 33, 151 32, 856 16, 232 6, 758 6, 031 4, 883 4, 799 3, 832 4, 799 3, 833 4, 799 3, 843 2, 312 1, 501	878 8 705 0 0 906 394 12,974 18 726 0 15 0 0 1,071 2,403 175 1	267, 501 213, 283 87, 935 62, 354 27, 474 48, 756 33, 443 16, 034 11, 990 6, 113 5, 818 5, 225 3, 517 2, 080 232 2, 092	950 *891 0 12 403 359 109 2,049 0 156 0 14 0 0 1,346 1,601 45 0 88	272, 460 192, 956 88, 885 60, 247 30, 839 20, 278 44, 601 11, 651 7, 638 5, 373 4, 908 2, 381 335 1, 677	524 1 483 0 2 280 465 3, 379 10 250 0 13 0 824 1, 339 856 0 15	292, 081 212, 780 81, 025 66, 490 30, 036 28, 302 35, 143 19, 268 11, 902 6, 284 6, 783 6, 284 5, 859 2, 182 2, 182 2, 182 3, 722 3, 728		279, 444 177, 180 69, 035 52, 630 22, 334 13, 984 5, 324 5, 277 3, 908 4, 058 4, 758 1, 602 1, 177 201
Total_	9, 792	804, 054	11, 823	803, 860	8, 032	785, 497	8, 480	832, 166	8,891	687, 90

Bureau of Agricultural Economics. Official sources.

TABLE 343 .- Lard, refined: Average price per 100 pounds, Chicago, by months, 1922 1931

Year	Jan.	Feb.	Mar.	Apr.	May	June -	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver- age
1922	Dolls. 11, 19 18, 20 14, 52 17, 59 16, 81 13, 59 12, 50 12, 75 11, 45 9, 62	Dolls 12.59 13.25 13.03 17.03 16.44 13.72 11.60 12.75 12.38 8.94	Dolls. 13. 50 13. 87 12. 84 18. 25 16. 70 14. 38 11. 50 13. 31 12. 12 10. 00	Dolls. 12. 62 13. 42 12. 50 17. 07 16. 75 14. 32 12. 50 13. 25 11. 65 10. 00	Dolls. 13. 15 13. 12 12. 19 16. 50 17. 13 14. 12 13. 10 12. 85 11. 50 9. 50	Dolls. 13. 22 13. 18 12. 13 18. 13 18. 48 13. 35 13. 50 12. 85 11. 00 9. 53	Polls. 13. 06 12. 84 13. 65 18. 42 18. 00 12. 25 14. 00 13. 22 10. 50 8. 65	Dolls. 13. 30 12. 83 15. 94 18. 94 17. 38 12. 54 14. 70 13. 56 12. 44 8. 32	Dolls. 13. 00 15. 06 16. 25 18. 95 17. 50 14. 25 15. 25 13. 81 14. 25 9. 00	Dolls. 14, 12 15, 22 18, 05 18, 75 16, 75 14, 50 14, 40 13, 17 13, 94 8, 58	Dolls. 13. 78 15. 72 16. 68 18. 50 15. 75 13. 60 13. 62 12. 21 12. 31 8. 47	Dolls. 13. 31 15. 04 18. 00 16. 67 15. 25 13. 25 12. 88 11. 94 10. 70 7. 65	Dolls. 13. 07 13. 90 14. 65 17. 90 16. 91 18. 66 13. 30 12. 97 12. 02 9. 02

Bureau of Agricultural Economics. Compiled from data of the livestock and meat reporting service of the bureau. Beginning January, 1927, prices represent refined lard in hardwood tubs, earlier prices represent pure lard in therees. Prices 1905 to December, 1921, available in 1927 Yearbook, p. 1018.

Preliminary.
 Year ended June 30.
 Includes elementarine.

Table 344.-Lard, American prime western steam: Average price per pound, in tierces, at Liverpool, 1921-1931

Year	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver- age
1922 1923 1924 1925 1926 1927 1927 1928 1929 1930	Cents 11. 3 13. 3 14. 8 18. 0 17. 2 14. 3 13. 6 13. 4 11. 9	Cents 12.9 13.0 13.1 17.5 16.5 14.4 12.9 13.5 12.2 9.8	Cents 13. 1 13. 7 12. 8 18. 7 16. 5 14. 4 13. 9 11. 8 10. 5	12 8 13 6 12 7 17.8	Cents 13. 6 12. 9 12. 3 17. 6 14. 1 13. 4 13. 4 11. 8 9. 5	Cents 13. 5 13. 0 12. 2 19. 1 18. 4 14. 4 13. 3 13. 5 11. 3	Cents 13. 2 12. 7 13. 7 19. 3 17. 8 14. 3 13. 7 13. 9 11. 2 9. 5	Cents 13. 3 12. 7 15. 8 19. 2 17. 0 13. 8 13. 9 13. 8 12. 3 8. 8	Cents 12. 7 14. 0 15. 8 19. 2 16. 6 14. 6 14. 4 13. 5 13. 2 8. 7	Cents 13. 2 14. 5 18. 1 17. 9 15. 8 14. 4 13. 9 12. 7 13. 2 9. 0	Cents 14. 1 15. 7 17. 2 17. 8 14. 2 14. 0 13. 4 12. 1 12. 5 8. 2	Cents 13. 6 15. 1 18. 1 16. 6 14. 3 13. 5 13. 2 11. 8 11. 3 7. 3	Cents 13. 1 13. 7 14. 7 18. 2 16. 5 14. 2 13. 5 13. 2 12. 0

Bureau of Agricultural Economics. Compiled from Manchester Guardian. An average of Friday quotations. Converted at monthly average rate of exchange as given in Federal Reserve Bulletins to 1925, inclusive; subsequently at par of exchange.

Table 345.—Bacon, Wiltshire sides, green, firsts: Average price per pound at Bristol, England, 1909-1931

Year	Amer- ican	Dan- ish	Irish	Brit- ish	Year	Amer-	Dan- ish	Irish	Brit- 18h
1909 1910 1911 1911 1912 1913 1914 1915 1916 1917 1918 1918	Cents 13.6 15.2 12.8 13.8 15.5 17.0 19.8 30.1 38.5 37.1 81.6	Cents 15. 0 15. 9 14. 3 15. 9 17. 1 16. 4 20. 4 24. 0	Cents 15.9 16.8 15.8 17.4 17.6 20.8 24.7 33.0	Cents 16 7 17 17 8 15.8 16 3 18 4 18 2 21.4 26.0 33.6 30.3 38.4 42.8	1921 1922 1923 1924 1925 1926 1927 1927 1928 1929 1930	Cents 21. 8 21. 2 17. 5 16. 6 23. 0 2 23. 5 3 17. 8 4 21. 9 19. 3 13. 9	Cents 32, 8 29, 7 23, 6 21, 3 27, 5 21, 1 21, 2 24, 5 20, 8 13, 1	Cents 34. 7 32. 5 25. 8 22. 8 20. 7 30. 6 25. 5 23. 6 25. 1 18. 7	Cents 36. 2 33. 3 27. 0 22. 5 30. 0 82. 3 26. 9 25. 8 28. 3 27. 6 19. 5

Bureau of Agricultural Economics. Compiled from Agricultural Market Report, Ministry of Agriculture and Fisheries, Great Britain. Average for the last week of each month 1908-1923. Average of weekly averages 1924-1931. Converted at monthly average rate of exchange as given in Federal Reserve Bulletins to December, 1925, inclusive; subsequently at par of exchange. Prices of Canadian bacon are given for the years 1909-1925 in Table 393, 1931 Yearbook; these prices have not been quoted for later years by the Ministry of Agriculture and Fisheries.

Table 346.—Hogs: Cholera-control work by Bureau of Animal Industry, 1918-19 to 1930-31

	Bureau veteri-	Premises	Demons	trations	Autop-	Farms	Farms	Omt
Year beginning July	narians engaged in work i	investi- gated	Number	Hogs treated	sies per- formed	quaran- tined or carded	cleaned and dis- infected	Out- breaks reported
1918-19	180 140 54 80 71 45 34 35, 96 38, 42 37, 41 36, 5 38, 43	93, 512 46, 145 29, 433 47, 137 52, 348 24, 460 20, 899 25, 004 25, 156 28, 939 26, 858 23, 226	3, 037 3, 420 4, 343 5, 234 3, 178 2, 353 2, 579 4, 863 4, 444 2, 648 1, 740 1, 460	283, 987 247, 702 67, 295 88, 846 108, 552 78, 007 51, 381 69, 230 97, 917 106, 906 56, 023 35, 158 29, 152	53, 586 10, 963 8, 888 5, 380 5, 247 3, 686 2, 883 2, 446 3, 741 2, 368 3, 328 2, 505 8, 011	9, 584 6, 129 2, 258 1, 401 1, 772 1, 634 886 884 1, 832 1, 117 1, 481 677 872	4, 382 2, 099 656 439 741 847 470 247 744 522 489 345 380	12, 336 9, 788 7, 951 7, 920 7, 204 7, 225 3, 487 4, 558 11, 555 6, 941 7, 029 4, 162 8, 388

Bureau of Animal Industry.

<sup>1 2</sup> quotations only.

<sup>&</sup>lt;sup>3</sup> Average for 11 months.

<sup>1</sup> Entire half of hog in one piece, head off, back bone out, ribs in.

Average for 11 months.
Average for 5 months.
Average for 9 months.

<sup>1</sup> Fractions in the number of veterinarians engaged denote part time devoted to hog-cholera-control work.

Table 347.—Hogs: Shipments, slaughter, value of production and income, by States, 1930

State and division		ents and slaughter Total	stocke ing	ments, ir, feed- and eding	slau	arm ghter Total	bomus	Receipts from sales	Gross income	Value of production
	riona	weight	neau	weight	Head	weight	farms			
Maine	Thou- sands 28 13 12 90 6 12 112 61 335	1,000 pounds 7,280 3,380 3,120 23,400 1,500 3,120 25,760 12,200 77,050	Thou-sands 1 2	1,000 pounds 100 200 1,100 200 3,375 300	Thou- sands 31 12 36 27 4 20 205 45 450	1,000 pounds 8, 370 3, 240 9, 360 7, 020 1, 000 48, 790 10, 350 112, 500	1,000 dollars 427 143 423 337 55 289 2,603 663 7,688	1,000 dollars 1,249 507 919 2,562 237 681 5,246 1,427 12,747	1,000 dollars 1,676 650 1,342 2,899 292 970 7,849 2,090 20,435	1,000 dollars 1, 502 551 1, 147 2, 704 284 898 6, 577 2, 013 18, 740
North Atlantic	669	156, 810	48	5, 275	830	205, 830	12, 628	25, 575	38, 203	34, 396
Ohio Indiana Illinois Michigan Wisconsin	2, 171 3, 348 5, 152 618 1, 880	488, 475 770, 040 1, 231, 848 126, 690 423, 000	8 16 28 17 1	880 1,920 3,220 1,700 100	670 550 620 260 460	167, 500 137, 500 155, 000 62, 400 103, 500	3, 691	48, 482 78, 351 113, 591 13, 932 39, 132	62, 180 85, 371 126, 285 17, 623 46, 335	59, 580 82, 929 125, 830 15, 792 46, 449
North Central, East	13, 160	3, 040, 053	70	7, 820	2, 560	625, 900	49, 306	288, 488	387, 794	330, 580
Minnesota Iowa Missouri North Dakota South Dakota Nobraska Nebraska	*, 067 790 3, 230 5, 468	1, 028, 720 2, 858, 485 919, 575 181, 700 742, 900 1, 388, 872 608, 625	36 81 31 1 8 25 46		501 813 210 160 282	71, 628	9, 824 15, 950 3, 322 3, 000 6, 045	120,820	97, 309 257, 823 98, 573 18, 093 65, 518 126, 865 69, 335	265, 074 95, 392 18, 518 66, 846 127, 779
North Central, West	33, 512		228	25, 135	2, 750	653, 543	52, 541	680, 975	733, 516	739, 451
North Central	46, 681	10, 858, 930	298	32, 955	5, 310	1, 279, 44	101, 847	969, 463	1, 071, 310	1, 070, 031
Delaware Maryland Virginia West Virginia North Carolina South Carolina Georgia Florida	23 110 152 105 165 80 416 176	4, 370 17, 600 32, 180 17, 750 33, 000 16, 000 64, 480 24, 990			192 769 377	33, 60 111, 15 48, 00 169, 18 81, 05 217, 78	2, 741 0 8, 303 0 3, 640 0 14, 812 5 6, 857 2 15, 681	2,616 5,097 2,957 6,797 2,009	5, 361 7 13, 400 1 6, 597 21, 600 8, 860	4,916 12,291 1 6,029 21,242 3 8,632 4 22,495
South Atlantic	1, 227	210, 370	8	300	3, 311	709, 26	7 54, 350	31, 27	85, 62	81, 658
Kentucky. Tennossee. Alabama. Mississippi. Arksnsss. Louislana. Oklahoma. Texas.	450 857 190 66 164 67 727 657	80, 377 74, 540 32, 400 9, 900 24, 600 10, 050 147, 400 138, 577		1, 625 150 280 100 750	615 642 0 549 0 561 0 305 0 365	153, 75 128, 40 109, 80 112, 20 49, 28 91, 25	0 11,636 0 8,834 0 7,113 0 6,900 0 3,03	8, 85, 84, 44° 3, 2, 78, 3, 80° 3, 80° 1, 62° 12, 55°	5 20, 49 7 13, 28 5 9, 89 6 10, 70 2 4, 65	1 18,991 1 11,848 8 9,454 6 8,882 5 4,246 8 18,241
South Central	2, 678	517, 840	58	6, 20	4, 380	987, 28	0 69, 760	56, 78	126, 55	115, 467
Montana Idaho Wyoming Colorado New Mexico Arlzona Utah Novada Washington Oregon California	002 41 17 61 27 146	44, 276 21, 090 21, 090 113, 871 8, 200 3, 400 9, 156 4, 986 30, 999 39, 830	0 1	200 1 100 3 1,800	31 0 39 0 10 0 109	10, 08 8, 05 23, 04 6, 20 1, 90 7, 80 3, 00 23, 98	0 1, 25 0 53 0 1, 66 0 40 0 11' 0 51 0 22 0 1, 32	4, 29, 1, 86, 10, 29; 75, 42; 88, 49; 4, 22; 4, 69	5, 55 0, 2, 39 9, 11, 96 8, 1, 16 8, 54 8, 1, 50 8, 72 1, 5, 55 0, 5, 83	3 5,617 5 2,360 2 12,167 3 1,053 0 519 4 1,363 2 739 0 5,112 2 5,467
Western United States	2, 127	423, 98	5 4	5, 06	730		0 10, 60	43, 80	_	2 52, 478

Bureau of Agricultural Economics. Estimates Division of Crop and Livestock Estimates. Subject to revision. For the five-year average 1924-28 see 1931 Yearbook Table 395. The figures on income and value of production as shown in Table 455 are computed from the data shown in this table. The difference between gross income and value of production arises from the fact that in computing value of production allowance is made for changes in inventory numbers at the beginning and end of the year while in computing income these changes are not used.

Table 348.—Sheep and lambs: Number on farms and value per head in the United States, 1840, 1850, 1860, 1867-1932

	Sheep o	n farms		Sheep o	n farms
Year	Number <sup>1</sup>	Value per head Jan. 1	Year	Number 1	Value per head Jan. 1
1840 <sup>1</sup>	28, 478 40, 853 40, 853 31, 679 33, 938 33, 784 33, 784 35, 740 35, 750 45, 237 50, 360 43, 352 44, 545 42, 589 44, 343 47, 274 45, 948	2.50 1.82 1.64 2.14 2.61 2.43 2.55 2.13 2.21 2.07 2.23 2.37 2.13 2.07 2.21 2.39 2.37 2.53 2.37 2.53 2.53 2.53 2.53 2.53 2.53 2.53 2.53	1900 3	\$5, 590 38, 392 40, 183 42, 302 45, 121	Dollars  2. 98 2. 66 2. 55 2. 85 3. 84 3. 94 4. 55 5. 11 7. 11 8. 22 4. 77 7. 88 6. 22 6. 22 6. 23 6. 24 6. 25 6. 21 6. 22 6. 22 6. 23 6. 24 6. 25 6. 21 6. 22 6. 23 6. 24 6. 25 6. 25 6. 26 6. 27 7. 88 7. 88 6. 22 6. 20 6.
1895	38, 299 36, 819	1. 58 1. 70 1. 82 2. 46 2. 75	1929	48, 249 56, 983 51, 383 52, 745 53, 912	10. 59 8. 94 5. 35 3. 40

Bureau of Agricultural Economics. Estimates of the crop reporting board. Revisions for the years 1920–1931 were made January, 1932.

· Preliminary.

<sup>&</sup>lt;sup>1</sup> Prior to 1900 estimates for each 10-year period represent an index of annual changes applied to census as base on first report after census data were available. Figures for 1900-1919 are tentative revised estimates of the Bureau of Agricultural Economics as first published in 1927 Yearbook.

<sup>2</sup> Italic figures are from the census. Figures for census years 1860, 1880, and 1890 exclude an estimated number of unenumerated sheep on ranges, as follows: 1800, 1,505,810; 1880, 7,000,000; 1800, 4,940,948. Caususes prior to 1900 excluded lambs. Census dates were June 1 from 1840 to 1900; Apr. 15, 1910; Jan. 1, 1920 and 1925; and Apr. 1, 1930. 1900, 1910 and 1930 include spring-born lambs.

<sup>3</sup> Original estimate of the Bureau of Agricultural Economics.

<sup>4</sup> Preliminary.

Table 349.—Sheep and lambs: Estimated number on farms and value per head, by States, January 1, 1928-1932

			Numbe	ır			Value	per he	ad 1	
State and division	1928 2	1929 3	1930 1	1931 2	1932 3	1928	1929	1930	1931	1932
Maine	Thou- sands 02 21 44 11 2 9 516 6 437	Thou-sands 84 19 43 11 2 9 518 7 441	Thou-sands 83 20 42 12 2 10 520 7 467	Thou- sands 85 19 41 11 2 2 11 489 8 481	Thou- sands 81 18 39 10 2 10 473 7 491	Dol- lars 8.50 9.50 9.30 10.60 10.50 10.80 11.10 12.20 9.50	Dol- lars 8. 40 9. 60 9. 00 10. 00 11. 00 11. 40 11. 50 9. 60	Dol- lars 8. 60 9. 40 9. 30 9. 60 11. 50 10. 90 10. 50 11. 60 9. 60	Dol- lars 5. 70 6. 20 5. 70 7. 30 7. 50 7. 50 6. 20 7. 50 5. 90	Dol- lars 3. 50 4. 50 3. 90 4. 50 4. 70 4. 40 5. 40
North Atlantic	1, 138	1, 134	1, 163	1, 147	1, 131	10.17	10. 35	9. 95	6. 05	4. 34
Ohio Indiana Illinois Michigan Wisconsin	2, 005 714 630 1, 263 444	2,005 741 680 1,334 459	2, 105 781 709 1, 304 517	2,000 809 719 1,213 529	2, 164 826 799 1, 285 546	8. 90 11. 00 10. 60 10. 90 10. 20	9. 00 11. 20 10. 80 10. 90 10. 40	8. 50 10. 50 10. 00 10. 10 9. 00	4. 60 5. 70 5. 90 5. 20 5. 30	3. 50 4. 00 3. 80 3. 90 3. 20
North ('entral East	5, 056	5, 219	5, 416	5, 270	5, 620	10.02	10. 16	9. 42	5. 13	3. 67
Minnesota Lowa Missouri North Dakota South Dakota Nebraska Kansas	666 983 942 549 863 905 512	772 1085 1, 131 672 1, 001 1, 050 632	910 1, 230 1, 180 802 1, 189 1, 208 659	1, 027 1, 313 1, 204 940 1, 332 960 669	1, 084 1, 398 1, 205 1, 040 1, 465 1, 047 779	10.50 10.80 10.10 10.80 10.60 9.10 9.30	10. 80 11. 00 10. 70 11. 10 10. 60 9. 50 9. 20	9. 60 9. 90 9. 10 9. 70 9. 00 8. 20 8. 40	5. 10 5. 50 5. 00 5. 00 5. 00 4. 70 4. 50	3, 20 3, 30 3, 30 3, 30 3, 00 3, 10
North Central West.	5, 420	6, 343	7, 178	7, 445	8, 018	10.18	10.44	9. 12	5. 04	3. 22
North Central		11.562	12, 594	12, 715	13, 638	10.11	10. 31	9. 25	5. 07	3, 47
Delawaro Maryland Virginia West Virginia North Carolina South Carolina Georgia Florida	8 104 437 536 85 15 41 53	8 111 468 574 94 15 39 50	4 113 490 601 88 14 38 45	4 111 495 625 90 14 38 44	4 108 485 657 91 14 87 43	12.00 11.60 11.50 11.10 9.10 4.90 3.80 3.60	11. 50 11. 50 11. 80 11. 40 9. 10 4. 90 4. 00 4. 30	11. 80 11. 50 11. 00 9. 90 8. 70 4. 90 4. 20 4. 10	7. 00 6. 90 6. 70 5. 90 5. 80 4. 60 3. 90 3. 30	5. 00 5. 10 4. 60 4. 40 3. 90 3. 70 2. 30 2. 40
South Atlantic	1, 274	1, 354	1, 393	1, 421	1, 439	10. 53	10.84	9. 96	6.08	4.3
Kentucky Tennessee Alabama Mississippi Arkansas Louisiana Oklahoma Texas	895 345 60 88 55 129 130 5, 047	910 352 63 90 54 139 160 5, 703	915 364 56 91 54 135 185 6, 387	875 382 50 91 56 133 174 6, 834	875 393 50 100 59 140 164 7,312	11. 20 9. 70 4. 40 3. 40 6. 10 3. 00 8. 60 8. 40	11. 40 9. 80 4. 20 3. 30 6. 50 3. 30 9. 90 8. 80	10. 40 9. 60 4. 40 3. 50 5. 90 3. 40 8. 90 7. 10	6. 50 5. 80 3. 40 2. 90 3. 30 2. 70 4. 60 4. 20	4. 70 4. 00 2. 60 2. 00 2. 60 2. 70 3. 00 2. 9
South Central	6, 749	7, 471	8, 187	8, 595	9, 093	8, 62	8. 96	7. 49	4. 45	3. 1
Montana. Idaho Wyoming Colorado. New Mexico. Arizona. Utah Nevada. Washington. Oregon. California.	2, 100 3, 306 3, 020	3, 854 2, 230 3, 471 3, 118 2, 385 1, 107 2, 870 1, 172 700 2, 501 3, 320	4, 120 2, 280 3, 540 3, 750 2, 527 1, 080 2, 900 1, 088 735 2, 576 3, 450	4, 214 2, 394 3, 894 3, 351 2, 780 1, 112 2, 900 1, 175 750 2, 679 3, 588	3, 820 2, 274 4, 128 3, 361 3, 058 1, 190 2, 755 1, 152 750 2, 679 3, 444	11. 10 11. 40 10. 60 9. 60 9. 30 11. 20 11. 00 11. 60 11. 30 11. 40	11. 40 11 90 11. 60 10. 60 10. 40 9. 60 11. 60 10. 80 12. 10 11. 50	9. 40 9. 80 9. 20 9. 00 8. 10 8. 00 9. 60 9. 20 9. 70 9. 10	5. 10 6. 10 5. 80 5. 60 4. 90 4. 80 6. 40 6. 30 5. 40 6. 30	3,5
Western	25, 484	26, 728	28, 046	28, 867	28, 611	10.68	11. 16	9. 13	5. 68	_
United States	45, 121	48, 249	51, 383	52, 745	53, 912	10. 22	10. 59	8.94	5. 35	3.4

Bureau of Agricultural Economics. Estimates of crop-reporting board. Revisions by State, 1920-1027 are published in February, 1932, Crops and Markets.

Sum of total value of classes divided by total number and rounded to nearest dime for States. Division and United States averages not rounded.
 Revised January, 1932.
 Preliminary.

Table 350.—Sheep: Number in countries having 100,000 and over, average 1921-1925, annual 1936-1931

Country	Month of estimate	A ver- nge 1921- 1925 1	1926	1927	1928	1929	1930	1931
North America, Central America, and West Indies: United States Canada	January	Thou- sands 37, 662 3, 027 2 1, 362	3 142	sands 42, 302	8and8	Thou- sands 48, 249 3, 636	Thou- sands 51, 383 3, 696	Thou- sands 52,745
United States. Canada Mexico. Guatemala Cuba Dominican Republic.		153	148	210		102		
Estimated total 3		42, 700	·	·				
South America: ColombiaVenezuela.		776	800	771			810	
Colombia Venezuela Ecuador Peru Bolivia Chile	December 6	(1, 000) 11, 363 3, 436		4, 151		4 1, 500 3 11, 209 6, 552		
Bolivia. Chile	September	4, 332 8 7, 933 8 14, 448	7 4, 094			4 19, 358	4 20, 558	
		(600) 4 36, 209 649		607	631		5 6 44, 413	
Estimated total 3		80, 900						
Europe: Iceland England and Wales Isle of Man	Junedo	565 14, 385 77	590 16, 859 90	17,072	627 16, 300 89	640 16, 105 92		
Scotland North Ireland Irish Free State Norway 10 Sweden	do	6, 827 456 2, 804 1, 380	7, 203	7, 536 600 3, 120	7,579 624 3,264	7, 556 654 3, 375	7, 622 704 3, 515	7, 697 793 8, 575
Faroe Islands	July	1, 380 1, 384 380 66	233	1, 608 708	1, 654 806	1, 533 193	652	1, 692
Netherlands Belgium	May-June December 6	668 126		10, 775	4 122 10, 693	10. 445		10, 152
Spain Portugal Italy Switzerland Germany	March-April	9, 777 19, 229 3, 684 12, 014 245	12,350	20, 529 44, 450 412,500	4 4, 900	10, 445 5 19, 370 4 4, 000	<sup>8</sup> 9, 896	184
Czechoslovakia	do	5, 889 526 38 986	4,758	4, 080	3, 819	3, 635	3, 480 5 272 5 11 831	
Hungary Yugoslavia Greece Bulgaria	December 6	1, 661 7, 728 5, 965	1, 804 7, 933 6, 636		1, 566 7, 722 6, 442	1, 573 7, 736 6, 920	1, 464 5, 806	608 1, 440 7, 953
Bulgaria Rumania Poland Lithuania	November June	8, 186 11, 660 2, 193 1, 314	12,950	18, 739 13, 116 1, 918 1, 410 1, 128	8, 427 12, 555	7, 986 12, 423 2, 523 1, 125	12, 092 2, 490 1, 097	11, 921 2, 594
Latvia Estonia Finland Russia (European and Asiatio),12	June July September Summer	1, 240 854	1, 153			906 476 1, 310	873 467	923
Estimated total ex- cluding Russia.3		123, 600						
Africa: Abysinnia (Ethiopia)		(2, 000)				4,000		
Morocco Algeria Libia (Italian) Tunis	77	(2, 000) 7, 533 5, 943 1, 043	6, 786	0, 000	822	8, 848 6, 196	7, 168	
French Sudan Gold Coast Nigeria including British		1, 794 3, 742 2, 173 378 1, 711	1, 829 4, 365 825	2, 142 3, 968 2, 400 350	2, 142 5, 341 2, 424 400	2, 178 5, 113 2, 789 400		2,976
Egypt Anglo-Egyptian Sudan British Someliland	September	1, 013 1, 638	1, 809 1, 144 2, 000 2, 000	1, 827 1, 232 2, 201 2, 000	1, 785 1, 180 2, 201 1, 300	2, 121 1, 003 2, 200 1, 700	' 1	
Italian Somaliland	min. 91	(2, 000) 1, 666	4, 000	2, 000	1, 300 5 1, 039	1,700 855	2, 000 . 847 .	

Table 350.—Sheep: Number in countries having 100,000 and over, average 1921-1925, annual 1926-1931—Continued

Country	Month of estimate	Aver- age 1921- 1925 1	1926	1927	1928	1929	1980	1931
Africa—Continued. Eritrea (Italian) 13		Thou- sands 1, 701	Thou- sands	Thou- sands 1,842	Thou- sands 5 1, 879	Thou- sands	Thou- sands	Thou- san <b>ds</b>
Eritrea (Italian) 13 Kenya Colony French Cameroon 13 Uganda	March-June	2, 600 287	2, 756 410	1, 842 2, 805 456	2, 847 441	2, 905 620	3, 228 664	
Uganda Belgian Congo	December 6	388	604 300	866	911 270	967 348	806 369	792
Belgian Congo Ruanda Urundi British Southwest Africa		150 954	125 1, 069	125	110 1, 524	125 1, 497		
Dochmonolond		105	132	152	152			<b>_</b>
Union of South Africa  Basutoland  Rhodesia, Southern  Tanganyika Territory 13	August	1, 954	2, 100	2.149	2, 100	2, 150	14 49, 240 2, 400	
Tanganyika Territory 13	December •	333 3, 893	349 4, 462	4,779	352 5, 062	359 5, 041	5,522	
Madagascar		110			142	201	263	
Estimated total 8		78, 500			===			
Asia:		(3, 500)		4 3, 500				
Arabia  Cyprus  Turkey, European and Asiatic.	March	237 10, 458	207	260	264 12, 079		290 <b>10,</b> 398	
Iraq (Mesopotamia) 11 Palestine	February March	5, 270 271	291	1 243	227	232	7, 153 253	
Persia. Syria and Lebanon. India, British. Native States China.		16, 562 1, 797	16, 562 1, 400	1.404	2.149	4 16, 000 2, 540	2.682	
India, British Native States	December-April	22, 412 12, 209	23, 201 11, 848	23, 237 12, 353	23, 350 12, 156	23, 336 12, 445	\$ 25,540 \$ 16,259	
Pumplines	Document	200	344	1	1	16 35, 000		
Dutch East Indies: Java and Madura Outer possessions	do	915 115		1, 292 121				
Estimated total ex- clusive of Russia.		114, 100						
Oceania:		07 17		404 000	100.000	100 401	104 550	100 000
Australia New Zealand	December 6 April	23, 382	24, 905	25, 649	100, 827 27, 134	103, 431 29, 051	104, 558 30, 841	
Estimated total 3		109,000						
Total countries re- porting all periods		1						
porting all periods including Russia— To 1930 (45) <sup>17</sup> To 1931 (16) <sup>17</sup> <sup>18</sup>		428, 938 237, 420	489, 900 260, 990	508, 988 276, 143	517, 876 280, 031	529, 065 287, 218	516, 107 207, 395	304, 208
Estimated world total. including Russia;		642, 400						

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture unless otherwise stated. Figures in parentheses are interpolated.

<sup>&</sup>lt;sup>1</sup> A verage for 5-year period if available, otherwise for any year or years within this period except as otherwise stated.

<sup>2</sup> Incomplete.

<sup>\*\*</sup>These totals include countries with less than 100,000 interpolations for a few countries not reporting each year and rough estimates for some others.

<sup>4</sup> Unofficial.

<sup>5</sup> Census figures. 6 Counties reporting as of Dec. 31 are considered as of Jan. 1 of the following year; i. e., figures for number of sheep in France as of Dec. 31, 1925, have been placed in 1926 column.

<sup>7</sup> Year 1925. 8 Year 1920.

June, 1930.

<sup>10</sup> In rural communities only.

<sup>13</sup> Years 1924-1926. Statistical Review, October, 1928, p. 6. Year 1927. Agricultural Statistics of the U.S. S. R. Lenin Academy, 1927-1930. Planned Economy No. 12, 1930, State Planning Board. 11 May.

 <sup>4-</sup> toors incuded.
 4- Estimate based on increase reported in June, compared with preceding June.
 4- Estimate based on increase in 1920 in provinces which supported 80 per cent of total in China in 1914.
 5- Average of range from 25,000,000 to 45,000,000.
 7- Comparable totals for number of countries indicated.
 Excluding Russia.

Table 351.—Sheep: Receipts and stocker and feeder shipments at all public stockyards, 1922-1931

### RECEIPTS

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1922 1923 1924 1925 1926 1926 1927 1928 1929 1930	Thou- sands 1, 835 1, 636 1, 697 1, 467 1, 548 1, 740 1, 705 1, 877 1, 903 2, 175	Thou-sands 1, 399 1, 366 1, 412 1, 388 1, 486 1, 501 1, 689 1, 544 1, 803 1, 964	Thou- sands 1, 465 1, 430 1, 367 1, 504 1, 558 1, 520 1, 527 2, 151 2, 120	Thou- sands 1, 227 1, 447 1, 348 1, 541 1, 502 1, 486 1, 591 2, 012 2, 230 2, 713	Thou-sands 1, 692 1, 794 1, 344 1, 689 1, 717 2, 013 1, 952 2, 173 2, 334 2, 810	Thou-sands 1, 700 1, 426 1, 550 1, 603 1, 913 1, 816 1, 913 1, 752 2, 230 2, 587	Thou-sands 1, 677 1, 661 1, 672 1, 699 1, 739 1, 676 1, 898 2, 119 2, 296 2, 535	Thou-sands 1, 951 1, 800 2, 005 2, 064 2, 277 2, 209 2, 362 2, 545 2, 583 3, 270	Thou-sands 2, 303 2, 059 3, 027 2, 627 3, 279 2, 848 3, 386 3, 355 3, 580 3, 900	Thou-sands 3, 311 3, 464 3, 295 3, 198 3, 090 3, 587 3, 938 4, 093 3, 784 3, 956	Thou-sands 2, 288 1, 816 1, 879 1, 712 1, 917 1, 896 2, 053 2, 168 2, 607 2, 811	Thou- sands 1, 516 1, 526 1, 605 1, 608 1, 706 1, 609 1, 610 1, 703 2, 307 2, 182	Thou- sands 22, 364 22, 025 22, 201 22, 100 23, 868 23, 939 25, 597 26, 868 29, 808 33, 023

## STOCKER AND FEEDER SHIPMENTS

1922 1923 1924 1925 1926 1927 1928 1929 1930	183 171 149 138 155 207 116 188 126 184	169 169 106 119 107 136 101 115 101	143 114 83 94 83 140 95 122 99	97 82 105 109 124 118 133 210 134 189	145 216 118 178 130 259 205 218 142 176	191 117 152 137 238 257 278 226 216 289	204 188 226 193 260 215 234 231 206 243	830 841 444 421 567 389 564 639 465 718	534 897 973 857 1, 093 943 1, 020 1, 027 907 1, 104	1, 138 1, 489 1, 438 1, 392 1, 150 1, 560 1, 466 1, 831 1, 024 1, 181	757 540 676 475 493 497 544 575 761 655	256 154 206 219 223 174 193 183 282 182	4, 167 4, 478 4, 676 4, 332 4, 623 4, 895 5, 011 5, 565 4, 463 5, 129
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Bureau of Agricultural Economics. Compiled from data of livestock and meat-reporting service of bureau,

Table 352.—Sheep: Receipts at principal public stockyards and at all public stockyards, 1922-1931

Year	Chi- cago	Den- ver	East St. Louis	Fort Worth	Kansas City	Omaha	South St. Joseph	South St. Paul	Sioux City	Total nine mar- kets <sup>1</sup>	All other stock-yards report-ing	Total all stock- yards report- ing 1
1922 1923 1924 1925 1926 1927 1927 1929 1933 1931	Thou- sands 3, 874 4, 098 4, 192 3, 969 4, 405 3, 829 3, 868 3, 785 4, 335 4, 489	Thou- sands 1, 867 1, 857 2, 040 2, 357 1, 826 1, 908 2, 295 2, 290 2, 062 2, 499	Thou- sands 628 561 489 559 636 574 510 534 661	Thou- sands 325 386 373 314 445 445 458 540 432 1, 173	Thou- sands 1, 574 1, 671 1, 569 1, 500 1, 762 1, 616 1, 767 1, 753 2, 016 2, 244	Thou- sands 2,533 2,970 2,844 2,420 2,780 2,604 8,037 3,031 3,410 3,510	Thou- sands 730 979 1, 089 1, 143 1, 303 1, 348 1, 580 1, 636 1, 634 1, 572	Thou- sands 499 454 476 545 773 705 891 1, 139 1, 354 1, 690	Thou- sands 223 216 310 360 449 527 568 840 1, 188 1, 279	Thou-sands 12, 252 13, 191 13, 381 13, 166 14, 378 13, 555 14, 974 15, 548 17, 015 19, 118	Thou-sands 10, 112 8, 834 8, 820 8, 934 9, 490 10, 384 10, 623 11, 320 12, 793 13, 905	Thou-sands 22, 364 22, 025 22, 201 22, 100 23, 868 23, 939 25, 597 26, 868 29, 808 33, 023

Bureau of Agricultural Economics. Compiled from data of the livestock and meat-reporting service of the bureau. Receipts, 1900-1921, are available in 1924 Yearbook, p. 933, Table 540.

<sup>1</sup> Rounded totals of complete figures.

Table 353.—Farm prices of sheep, per head, by ages, United States, January 1, 1912-1932

Jan, 1—	Under 1 year old	Ewes 1 year and over	Wethers 1 year and over	Rams	Jan. 1—	Under 1 year old	Ewes 1 year and over	Wethers 1 year and over	Rams
1912	Dollars 2. 64 3. 11 3. 22 3. 62 4. 13 5. 63 9. 06 8. 82 8. 87 5. 33 4. 25	Dollars 3. 45 3. 98 4. 59 5. 35 7. 48 12. 70 12. 44 11. 04 6. 38 4. 83	Dollars 3, 43 3, 93 4, 06 4, 48 5, 02 6, 78 11, 26 11, 02 9, 64 4, 05	Dollars 8. 26 8. 80 8 49 9 01 10. 32 13. 62 20. 84 21. 90 21. 94 15. 13 11. 31	1923 1924 1925 1926 1927 1928 1929 1930 1930 1931	Dollars 6. 80 6. 97 8. 53 9. 04 7. 91 8. 45 8. 93 7. 85 4. 64 2. 87	Dollars 7. 67 8. 10 10. 02 11. 01 10. 32 10. 86 11. 19 9. 10 5. 43 3. 47	Dollars 5. 90 5. 98 7. 13 7. 32 6. 60 7. 23 7. 64 6. 44 3. 43 2. 38	Dollars 14. 30 15. 55 16. 91 18. 45 19. 63 20. 27 19. 63 12. 94 8. 23

Bureau of Agricultural Economics. Based on returns from special price reporters. Average price, by States, weighted by estimated numbers each age group.

Table 354.—Sheep: Estimated average price per 100 pounds received by producers, United States, 1922-1931

Year	Jan. 15	Feb.	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oet. 15	Nov. 15	Dec. 15	Weighted average
1922	Dolls. 4. 57 6. 88 6. 71 7. 86 7. 95 6. 87 7. 52 7. 84 6. 91 4. 04	Dolls. 5.71 6.83 6.82 8.41 8.20 7.16 7.60 7.98 6.84 4.15	Dolls. 6.51 7.06 7.22 8.20 7.60 7.41 7.85 8.36 6.59 4.24	Dolls. 6.43 7.20 7.45 8.42 7.67 7.40 8.11 8.40 6.44 4.24	Dolls. 6.65 6.92 7.33 7.53 7.78 7.68 8.09 5.86 3.91	Dolls. 6.09 6.43 7.09 7.04 7.56 7.27 7.84 7.86 5.52 3.28	Dolls. 6.11 6.43 6.60 7.17 7.09 7.16 7.56 7.25 4.65 8.01	Dolls. 5. 98 6. 22 6. 32 7. 32 6. 92 7. 13 7. 53 7. 32 4. 13 3. 00	Dolls. 5.70 6.57 6.30 7.27 7.13 7.06 7.58 7.01 4.21 2.80	Dolls. 5. 93 6. 33 6. 32 7. 31 6. 93 7. 05 7. 50 6. 83 3. 93 2. 63	Dolls. 6.02 6.20 6.39 7.51 6.75 7.42 7.50 6.75 3.98 2.63	Dolls. 6, 27 6, 39 6, 84 7, 79 6, 95 7, 38 7, 29 6, 61 3, 96 2, 52	Dolls. 5, 96 6, 65 6, 81 7, 70 7, 43 7, 28 7, 55 5, 36 3, 43

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices by States, weighted by number of sheep Jan. 1, to obtain a price for the United States; yearly price obtained by weighting monthly prices by Federal inspected slaughter. For previous data see 1930 or earlier yearbooks.

Table 355.—Lambs: Estimated average price per 100 pounds received by producers, United States, 1922-23 to 1931-32

Year	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar. 15	Apr.	May	Weighted
. 545	15	15	15	15	15	15	15	15	10	10	10	15	average
	Dolla.	Dolls.	Dolla.	Dolls.	Dolls.	Dolls.	Dolls	Dolla.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.
1922-23	9.87				10, 06	10, 30	10.49	10.09	10.83	11.01	10.69	11.00	10.30
1923-24	10.72	10, 60	9, 96	10.28	10, 17	10.01					11, 32	11,43	
1924-25	11. 21		10.15			10.55	10 96					11.99	
1925-26	11.62						12.67	12.79					
1926-27	12, 07			11.32									
1927-28	11.95					11.42	11.39						
1928-29	13, 18												
1929-30	12.31												
1930-31	9.02		6.82						6. 59	6.84	6.94	6.96	6.92
1931-32	6.42	5.60	5. 33	5.04	4.64	4.46	4, 19						
	1	1						i		1	1	1	1

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices by States, weighted by number of lambs Jan. 1, to obtain a price for the United States; yearly price obtained by weighting monthly prices by receipts at principal markets. For previous data see 1930 or earlier year-books.

Table 356.—Sheep and lambs: Average price per 100 pounds at Chicago, by months, 1901-1931

### SHEEP

Year	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver- age 1
1901 1902 1903 1904 1905 1906 1906 1908 1909 1911 1912 1913 1914 1914 1915 1916 1917	Dolls. 4.08 4.18 4.12 5.15 5.40 5.15 5.40 5.55 5.50 7.20 10.20	Dolls. 4. 10 4. 70 4. 65 5. 55 5. 12 5. 20 6. 50 6. 15 4. 15 5. 90 6. 45 7. 75 11, 23 12, 35	Dolls. 4. 60 4. 70 5. 45 0 5. 50 5. 28 5. 50 6. 25 7. 67 0 6. 49 5. 92 5. 25 11. 70 13. 60	Dolla. 4.72 5.65 5.05 5.08 5.35 5.65 7.60 6.45 7.70 8.15 12.16,65	Dolls. 4. 22 5. 70 4. 82 5. 70 4. 82 6. 15 5. 78 6. 15 5. 85 5. 88 20 13. 75	Dolls. 3. 68 4. 20 4. 20 4. 24 5. 45 6. 50 5. 10 3. 80 5. 10 5. 05 5. 10 6. 50 7. 35 10. 00	Dolls. 3. 52 3. 72 3. 48 3. 85 5. 10 5. 25 5. 32 4. 70 4. 20 3. 95 5. 40 5. 40 5. 40 5. 25 9. 10	Dolls. 3. 45 3. 55 3. 22 3. 95 4. 98 5. 32 4. 80 4. 20 3. 50 5. 55 5. 55 6. 25 9. 75	Dolls. 3.32 3.38 3.18 3.50 4.72 5.15 5.18 3.75 4.25 3.80 5.75 5.75 6.11 15	Dolls. 3. 30 3. 35 3. 18 3. 05 5. 10 4. 90 4. 82 4. 05 4. 30 3. 95 5. 20 6. 00 11. 65	Holls. 3. 18 3. 32 3. 05 4. 08 5. 10 5. 05 4. 38 4. 20 3. 45 4. 60 5. 65 5. 85 5. 80 11. 25	Dolls. 3. 45 3. 65 3. 20 4. 58 5. 28 4. 18 4. 85 3. 90 3. 55 4. 95 5. 40 6. 20 911, 50	Dolls. 3.79 4.18 3.96 4.20 5.08 5.21 5.20 4.69 4.59 5.19 5.56 6.36 7.10 6.36 7.10 6.36
1019	10. 35 11. 80 7. 26 7. 72 8. 16 10. 33 9. 72 6. 94 7. 03 9. 32 6. 50 8. 50	11. 25 13. 35 4. 90 8. 28 8. 08 9. 12 9. 69 9. 18 8. 96 8. 78 5. 53 4. 25	14. 05 13. 40 6. 14 9. 17 8. 64 10. 50 9. 22 8. 82 8. 88 9. 47 9. 72 5. 59 4. 54	14. 50 14. 50 14. 50 14. 55 6. 58 9. 33 8. 90 10. 21 7. 84 8. 87 9. 62 10. 16 10. 34 5. 66 3. 90	12, 25 12, 25 12, 25 13, 33 1, 35 1, 35 1, 36 1,	13. 40 8. 30 8. 50 4. 46 5. 59 5. 82 6. 25 5. 85 5. 88 6. 12 6. 28 3. 38 1. 62	12.65 9.70 8.90 5.08 6.12 5.66 7.597 6.25 6.28 5.12 2.50	13. 15 9. 75 7. 70 4. 53 5. 63 7. 018 6. 83 6. 85 6. 47 6. 72 5. 34 3. 53 2. 03	11.80 8.30 6.85 4.49 6.05 5.46 6.05 6.05 6.14 6.34 4.50 3.50	10.45 8.15 6.45 4.71 6.25 6.36 7.64 6.12 6.00 6.18 4.70 8.10	9. 85 8. 30 5. 75 4. 48 6. 62 8. 16 8. 18 6. 64 5. 58 6. 5. 58 8. 34 2. 16	9.40 9.60 4.70 4.92 7.37 8.45 9.58 9.58 9.58 1.03 5.41 3.22 2.18	12. 44 10. 47 9. 40 5. 13 7. 15 7. 57 8. 25 7. 25 7. 39 6. 87 4. 32 2. 79

### LAMBS

Bureau of Agricultural Economics. Figures prior to 1921 are from the Chicago Drovers Journal Year-book, average native and western sheep and average aged lambs. Subsequent figures are bulk of sales prices from data of the livestock and meat reporting service of the bureau.

<sup>1</sup> Simple average of monthly prices.

Table 357.—Sheep and lambs: Average price per 100 pounds at Chicago and Omaha, by months, July, 1930-December, 1931

## CHICAGO

	1						
	La	mbs	Yearling wethers	E7	ves	Feeding 50-75	lambs, counds
Year and month	90 pounds down, Good and Choice	All weights, Common	90–110 pounds Medium to Choice	90-120 pounds, Medium to Choice	All weights, Cull and Common	Good and Choice	Medium
1930 JulyAugustOctober	Dollars 10.13	Dollars 6.89	Dollars 7.43	Dollars 3. 28	Dollars 1. 85	Dollars 7, 22	Dollars 6, 52
August	9, 40 8, 49	6.20 5.64	6.44	3.47	2.01	6.89	6. 12
October	8.06	5.60	6. 14 5. 60	, 3.60 3.20	2. 22 1. 79	7.12 7.00	6. 16 6. 08
November	7.95	5, 46	5, 93	3. 38	1. 88	7.06	6.09
December	7.97	5. 50	5.70	3. 12	1. 76	7. 12	6. 12
Average, 6 months	8. 67	5.88	6. 21	3. 34	1. 92	7. 07	6. 18
1931							
January	8.71 8.59	6.48 6.52	6.65	3, 92	2, 61	7. 52	6. 65
February March	8,89	6.91	6. 55 6. 92	4. 32 4. 50	2. 89 3. 00	7.98 7.99	7. 12 7. 10
April May 1	9.35	7.56	6.94	4.12	2.69		
		6. 69 <b>5. 7</b> 8	6. 05 5. 53	2.96 2.04	1.80 1.09		
July	7.67	4.78	4.94	2 64	1.48	5. 30	4. 46
August	7.58	4.41	4.92	2 64 2 57 2 01	1,44	5. 41	4. 73
September	6.84 6.36	4. 27 4. 23	4.70 4.43	2.01 2.21	1. 11 1. 27	5.41	4.58
July August September October November	6.02	4.05	4. 15	2. 21	1. 46	5. 16 4. 76	4. 58 4. 43 4. 25
December	5.68	3.86	3.85	2, 40	1. 54	4.72	4. 12
Average	7.77	5. 46	5. 47	3. 00	1.86		
		OM	AHA				
1980							
July	9.54	6.58	6.12	2.72 3.24	1.50	6.80	5. 91
August	8.93	5.86	5. 47 5. 62	3, 24	1.75 1.64	6. 61 6. 73	5.66
Sepiember October	7.56	5. 40 5. 29	5.03	2.98 2.51	1. 40	6. 50	5. 76 5. 56
November	7, 50	5.48	5. 44	3, 17	1.74	6.74	5. 69
Decomber	7. 63	5. 22	5. 40	3, 22	1.86	6.92	5. 90
Average, 6 months	8.16	5. 64	5. 51	2, 97	1.65	6 72	5. 75
1931							
January	8, 22 8, 21	6. 10 6. 35	5. 72 5. 97	3. 56 4. 13	2. 00 2. 46	7.60 7.58	6. 28
February	8.42	6.61	6, 26	4, 38	2.69	7.81	6. 45 6. 69
April	8.97	7. 50	6, 58	3. 79	2.31	7.98	6.75
May 1	8.62	6. 83 5. 54	5. 98 4. 80	2.74 1.48	1.74 .87	7. 52 5. 45	6. 42 4. 61
June 2 July	8. 22 7. 02	4.49	4. 24	2.02	1, 17	5, 23	4, 41
August	7.12	4, 56	4. 50	2. 15 1. 84	1.14	5, 11	4, 31
August September October	6. 33 5. 78	4, 25 3, 90	4.07 4.06	1.84 1.96	. 98 1. 04	5. 08 4. 53	4. 22 3. 55
November	0.00	3, 69	3, 88	2, 00 1, 95	1.00	4.28	3, 33
December	5. 23	3. 57	3. 60	1.95	1.00	3.96	3. 15
Average	7. 31	5. 28	4.97	2. 67	1. 53	6.01	5. 01

Bureau of Agricultural Economics. Compiled from data of the livestock and meat-reporting service of the bureau. Earlier data in 1927 Yearbook, pp. 1032–1034 and in 1931 Yearbook, p. 870.

<sup>&</sup>lt;sup>1</sup> Beginning May 18, quotations were on shorn basis.

<sup>2</sup> Effective June 1, new crop lambs were classified as lambs and lambs of or closely approaching the yearling age were classified as yearlings.

Table 358.—Sheep and lambs: Slaughter under Federal inspection by months, 1922-1931

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1922	Thou- sands 954 1, 021 1, 083 990 1, 115 1, 151 1, 150 1, 225 1, 426	Thou- sands 776 836 912 854 988 1,006 1,048 953 1,187 1,223	Thou- sands 837 977 868 984 1, 163 1, 027 1, 016 1, 006 1, 358 1, 324	Thou- sands 739 960 860 1,012 994 960 918 1,119 1,387 1,493	Thou- sands 872 972 959 1,030 959 992 1,016 1,202 1,370 1,444	Thou- sands 1, 028 914 975 999 1, 081 1, 058 1, 109 1, 108 1, 516	Thou- sands 964 962 1, 051 1, 071 1, 042 1, 014 1, 255 1, 411 1, 491	Thou- sands 1, 024 957 1, 063 1, 031 1, 168 1, 196 1, 298 1, 413 1, 598	Thou- sands 1, 013 900 1, 150 1, 086 1, 224 1, 185 1, 307 1, 317 1, 591 1, 667	Thou- sands 981 1,046 1,148 1,083 1,167 1,194 1,400 1,365 1,727 1,804	Thou- sands 882 915 950 879 1,071 1,189 1,159 1,159 1,306 1,505	Thou- sands 858 978 972 981 1, 172 1, 094 1, 053 1, 091 1, 427 1, 581	Thou- sands 10, 929 11, 529 11, 991 12, 001 12, 883 13, 488 14, 023 16, 696 18, 071

Bureau of Animal Industry.

Table 359.—Mutton and lamb: International trade, average 1925-1929, annual 1927-1930

					Calenda	ar year				
Country	Averag	e 1925– 29	19	27	19	28	19	29	103	0 1
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Im- ports
Argentina Australia? Uruguay Netherlands Irish Free State Union of South Africa	1,000 pounds 301,079 176,547 72,153 41,048 14,942 1,370	0 17 0 1,049 344 20	311, 135 183, 260 93, 520 52, 102 16, 084 1, 478	0 6 0 1, 254 275 52	1,000 pounds 317,539 171, 108 46, 363 31, 010 14, 380 2, 359 201	0 4 0 759 312 47	1,000 pounds 305, 951 177, 576 84, 929 49, 112 12, 859 2, 771 160	0 24 0 692 246	381, 914 177, 693 100, 411 562, 259 11, 342 2, 115	1,000 pounds 0 0 0 0 550 244
Total	607, 310	1, 430	657, 712	1, 587	582, 960	1, 122	633, 358	962	736, 033	794
United Kingdom France Germany United States Norway Belgium Canada Denmark Sweden	0 213 637 1,087 0 702 1,501 9	629, 309 22, 035 7, 868 7, 255 4, 581 8, 763 2, 335 2, 152 1, 058	0 274 622 937 0 839 1,889 5	627, 303 29, 822 10, 083 9, 544 4, 902 3, 914 1, 946 2, 232 1, 371	0 305 79 1,024 0 445 1,128 1 45	640, 414 15, 173 0, 909 9, 202 4, 358 3, 970 2, 333 2, 397 1, 089	0 141 3 835 0 1,125 573 0 38	642, 712 21, 060 0, 120 11, 395 4, 714 4, 896 4, 401 2, 588 953	0 143 2, 457 1, 251 0 1, 724 241 8 5	730, 270 30, 053 9, 679 8, 181 4, 904 4, 397 4, 412 2, 594 1, 515
Total	4, 185	680, 356	4, 596	691, 117	3, 027	688, 845	2,715	701,848	5, 546	796, 005

Bureau of Agricultural Economics. Official sources except as otherwise noted.

Table 360.—Mutton and lamb, frozen: Cold-storage holdings, United States 1922-1931

Year	Jan. 1	Feb. 1	Mar. 1	Apr.1	May 1	June 1	July 1	Aug. 1	Sept. 1	Oct. 1	Nov.1	Dec. 1
1922	1,000 pounds 6, 444 4, 523 2, 493 2, 949 1, 820 4, 556 4, 408 5, 623 5, 817 4, 677	1,000 pounds 8, 914 5, 980 2, 336 2, 354 4, 447 4, 404 4, 009 4, 667 4, 081	1,000 pounds 2,863 5,758 2,173 2,294 3,346 4,074 4,020 3,252 5,408 3,573	1,000 pounds 2, 878 6, 635 1, 719 2, 090 3, 289 2, 940 3, 252 8, 109 5, 174 3, 063	1,000 pounds 2,071 5,774 2,093 1,998 2,393 1,862 1,828 2,533 5,190 2,529	1,000 pounds 2, 310 4, 445 2, 273 1, 913 1, 697 1, 210 1, 276 2, 461 4, 639 2, 371	1,000 pounds 3,720 8,556 2,917 1,535 1,871 1,360 1,947 8,061 4,820 2,685	1,000 pounds 8, 308 2, 752 2, 257 1, 349 1, 813 1, 161 1, 822 2, 639 4, 476 1, 892	1,000 pounds 3, 376 1, 785 2, 230 1, 339 1, 929 1, 302 1, 691 3, 159 3, 977 1, 975	3, 478 1, 719 2, 525	1,000 pounds 8,458 1,997 3,166 1,435 2,814 2,958 4,321 4,992 4,326 1,975	1,000 pounds 3, 633 2, 014 8, 326 1, 549 3, 166 3, 790 5, 472 5, 194 4, 628 1, 985

Bureau of Agricultural Economics. Compiled from reports made by cold-storage establishments.

<sup>&</sup>lt;sup>1</sup> The figures include condemned carcasses.

<sup>&</sup>lt;sup>1</sup> Preliminary. <sup>1</sup> Year ended June 30. <sup>2</sup> International Yearbook of Agricultural Statistics.

Table 361.—Sheep and lambs: Shipments, slaughter, value of production, and income, by States, 1930

	#12CO1	ice, og k						
	Ship	ments an	d local sla	aughter	Inship	ments, si and bree	ocker, fe	eding,
State and division	Sh	оер	La	mbs	Sh	юр	Lan	ıbs
	Head	Total weight	Head	Total weight	Head	Total weight	Head	Total weight
Maine	Thou- sands 11	1,000 pounds 1,100 300	Thou- sands 21	1,000 pounds 1,260	Thou- sands 1	1,000 pounds 100	Thou- sands	1,000 pounds
New Hampshire	3 3 3	300 300 300	14 4	240 840 260	i	100		
Rhode Island			1 3	65 195				
New York New JerseyPennsylvania	53	6, 201	205 2 159	14, 410 150 11, 130	4	400	27	1,620
North Atlantic	122	5, 145 13, 346	413	28, 550	6	600	29	1,740
Ohio	170	19, 550	903	63, 210	4	400	32	2, 080
Indiana	57 78 127	6,840 8,760 15,240	531 533 816	46, 835 45, 305	26 9 9	2, 600 900 900	150 186 90	9,750 13,020 6,120
MichiganWisconsin	49	5, 390	390	69, 360 31, 200	18	6,780	166	11, 620 42, 590
North Central, East	476 94	10, 396	3, 193 520	255, 910 43, 144	56	5, 600	163	
Minnesota Iowa Missouri North Dakota	121 104	11 440	1, 025 866	43, 144 82, 000 64, 950	48 25 10	4,800 2,625	500 245 97	9, 780 32, 500 15, 925
North Dakota South Dakota Nebraska.	53 62	5, 830 6, 820 7, 590 7, 810	385 530 1,504	28, 875 39, 750 135, 340 52, 455	10 10 46	1,000 1,100 4,600	143 1,106	6, 305 10, 725 71, 890
Kansas	69 71		583	52, 455	28	2,800	460	29, 900
North Central, West	574	64, 406	5, 413	446, 514	223	22, 525	2,714	177, 025
North Central	1,050	120, 186	8,606	702, 424	289	29, 305	3,338	219, 615
Delaware.  Maryland	9 29 45 9	990 3,480 4,950 765	79 327 332 34	6, 320 26, 160 26, 560 1, 870	1	110 90	2	130
South Carolina	1 1 6	90 85 510	3 8 5	135 400 250				
South Atlantic	100	10, 870	789	61,760	2	200	2	130
Kentucky	105 31	11,670 3,410	838 224	62, 850 16, 800	11 2	1,100	2	140
Kentucky	6 5	480 400	12	600 150	ī			
Louisiana	4	420 872	12 5	720 250	i	90	50	0 50
Oklahoma. Texas	24 285	2, 520 27, 075	91 519	5, 915 31, 790	15 12	1,500 1,200	37	2,500 420
South Central	464	46, 347		119, 075				3,000
Montana	231 190 133 155 51	1 11 000	1,780 1,622 1,360 2,615 606	133, 500 129, 760 96, 986 209, 200 39, 390 16, 721		15,00 1,20 7,00	กเรเล	2, 04 92, 54 21
Washington	31 130	23, 005 8, 375 3, 410 14, 552	382 1,111	23, 536 80, 566 84, 48		2,00 2 21 4 40 4 44	0 50 0 18 0 24	1, 17 1, 68
Oalifornia	325	82, 500	1,850	189, 55	_	_		
Western	1, 643			982, 03				
United States	_1 3, 379	1 365, 590	24, 549	1,893,84	g / 73	6   73,04	5   5, 54	. 1 000, 6

See footnote at end of table.

Table 361.—Sheep and lumbs: Shipments, slaughter, value of production, and income, by States, 1930—Continued

State and division			Farm sl	aughter		Value	Ī		
State and division		Sh	eep	La	mbs	amount			Value of produc-
Maine	State and division	Head	Total weight	Head		sumed	irom saies	income	tion
North Atlantic   28	Maine	sands 2 2	pounds 200 200	sands 5	pounds 300 120 120	dellar 8 10 5 4	dollars 201 56 107 41	dollars 211 61 111 42	1,000 dollars 201 46 111 42
Ohfo	Connecticut	15 8		35 1	2, 485 75	30 2	1, 776 21	1,806 23	1, 570 22 1, 318
Indiana	North Atlantic	28	3, 135	59	4, 070	68	3, 512	3, 580	8, 353
Minesota	Indiana	4	125 480 840	2 5 8	160 425 600	14 51 31	3, 488 3, 375 6, 039	3, 502 3, 426 6, 070	5, 383 3, 593 3, 199 5, 441 2, 063
North Central   12   1,500   13   1,700   71   4,912   4,983   4, North Dakota   0   720   0   720   67   1,642   1,700   2, South Dakota   4   440   10   750   76   3, 610   2, 688   8, Nebraska   2   220   1   75   10   7,643   7,652   4, Kansas   2   240   3   228   25   2,901   2,926   2, North Central   West   37   4,464   58   4,561   495   27,659   28,154   25, North Central   62   7,494   93   7,426   731   48,170   48,910   45, North Central   62   7,494   93   7,426   731   48,170   48,910   45, North Central   1   110   2   160   10   705   715   2,625   2,001   2,926   2,926	North Central, East	25	3, 030	35	2, 865	236	20, 520		19, 679
North Central   62   7, 494   93   7, 426   731   48, 170   48, 910   45,	IowaMissouriNorth Dakota North Dakota South Dakota Nebraska	12 5 6 4 2	1,500 600 720 440 220	13 10 9 10	1, 066 750 720 750 75	147 71 67 76 19	4, 721 4, 912 1, 642 2, 610 7, 643	3, 320 4, 868 4, 983 1, 709 2, 686 7, 662	8, 983 4, 521 4, 517 2, 139 8, 118 4, 319 2, 872
Delaware	North Central, West	37	4,461	58	4, 561	495	27, 659	28, 154	25, 419
Maryland	North Central	62	7,494	93	7, 426	731	48, 179	48, 910	45, 008
South Atlantic         16         1,600         27         1,990         143         6,257         0,400         6           Kentucky         7         840         9         675         67         6,352         6,410         6           Temessee         3         330         5         375         32         1,729         1,761         1           Alabama         2         160         2         100         7         80         96           Mississippi         1         80         2         100         6         38         44           Aricansas         1         105         3         180         7         72         70           Louisiana         2         186         4         200         13         47         60           Oklahoma         2         220         2         130         16         363         379         6           Teras         5         450         11         770         68         3,612         3,680         6           South Central         23         2,371         38         2,530         216         12,302         12,518         15           M	Maryland	1 7	480 660 180 90	10 3 1	720 800 165 45	50 57 14 3	705 2, 575 2, 613 239 24 49	2, 625 2, 670 253 27	4 693 2, 598 2, 792 209 19 65 48
Mississippl.   1   80   2   100   6   38   44			1,690	27	1, 990	143	6, 257	6, 400	6, 488
Montana	Alahama. Mississippi. Arkansas. Louisiana. Oklahoma.	1 1 2 2	830 160 80	5 2 2 3 4 2	375 100 100 180 200 130	32 7 6 7 13	38 72 47 363	96 44 79 60 379	6, 069 1, 865 70 41 85 69 421 6, 814
New Mexico	South Central	23	2, 371	38	2, 530	216	12,302	12, 518	15, 440
	Idako Wyoming Colorado New Maxico Arizona Utah Nevada Washington Oregon California	8 5 17 60 55 25	920 550 1, 785 6, 000 5, 885 2, 675 800 600 1, 870	10 10 22 24 20 23 7 15 18	800 710 1,760 1,680 1,500 1,725	80 63 213 853 884 210 59 42 119	1,929 6,191 1,826 2,148 6,278	7, 618 6, 884 11, 739 2, 628 2, 313 6, 401 1, 885 2, 190	10, 630 8, 300 8, 042 7, 903 8, 794 2, 814 7, 007 2, 26 2, 306 7, 22 13, 06
United States 384 89,575 428 31,815 3,062 139,111 142,178 144	Western	235	24, 885	209	15, 799	1, 904	68, 861	70, 765	73, 96
	United States	. 364	89, 575	426	31, 815	3, 062	139, 111	142, 178	144, 34

Bureau of Agricultural Economics. Estimates of Division of Crop and Livestock Estimates. Subject to revision. For 5-year average 1924-1928 see 1931 Yearbook Table 414. The figures on income and value of production as shown in Table 455 are computed from the data shown in this table. The difference between value of production and income arises from the fact that in computing value of production allowance is made for changes in inventory numbers between the beginning and end of the year, while in computing income these changes are not used.

Table 362.—Wool, shorn: Estimated production by States, 1925-1931

State and division			P	roductio	m			Numi	
	1925	1926	1927	1928	1929	1930	1931	1925	1926
Maine	1,000 pounds 526 102 252 68 12 41 2,898 31 2,805	559 110 277 62 12 43		1,000 pounds 529 122 268 02 12 46 3,096 30 2,898	1,000 pounds 470 109 264 59 12 40 3,096 37 2,982	1,000 pounds 471 113 255 66 12 46 3, 110 37 3, 108	1,000 pounds 491 107 252 59 12 51 3,008 43 3,248	Thou- sands 81 16 35 11 2 7 397 5 374	Thou- sands 86 17 38 10 2 7 422 5 374
North Atlantic	6, 735	6, 906	7, 045	7, 063	7, 069	7, 218	7, 271	928	961
Ohio	14, 467 3, 562 3, 352 7, 416 2, 250	14, 760 3, 715 3, 794 7, 600 2, 475	15, 662 3, 922 4, 186 8, 446 2, 774	14, 776 4, 402 4, 166 8, 774 2, 888	14, 661 4, 500 4, 514 8, 480 2, 888	15, 060 4, 752 4, 815 8, 400 8, 225	15, 453 4, 980 4, 797 8, 526 3, 102	1, 786 488 465 927 300	1, 800 502 530 950 330
North Central, East	81,047	32, 344	34, 990	35, 006	35, 043	36, 258	36, 858	3, 966	4, 112
Minnesota	3, 151 5, 440 5, 537 2, 263 4, 446 2, 114 2, 028	3, 634 5, 520 5, 500 2, 772 4, 772 2, 334 2, 183	4, 211 5, 880 5, 505 3, 654 5, 418 2, 400 2, 393	4, 700 6, 320 5, 686 4, 250 6, 149 2, 544 2, 710	5, 372 6, 800 6, 699 5, 287 7, 003 2, 685 3, 172	6, 115 7, 640 6, 865 6, 264 7, 794 3, 000 3, 365	6, 435 7, 920 7, 304 7, 012 8, 820 2, 786 3, 243	404 680 850 276 570 290 300	460 690 855 334 582 315 800
North Central, West	24, 979	26, 715	29, 461	32, 359	37, 018	41, 043	43, 520	3, 370	3, 566
North Central	56, 020	59, 059	64, 451	67, 365	72, 061	77, 301	80, 378	7, 336	7, 678
Delaware	12 439 1, 485 2, 272 270 48 131 147	472 1, 695 2, 205 304		1, 965 2, 646 857 55	19 561 2, 105 2, 798 408 52 116 124	19 580 2, 200 2, 844 376 52 112 114	24 552 2, 225 3, 021 394 52 112	2 72 316 437 60 12 41 49	2 75 326 416 66 11 41 48
South Atlantic.	4, 804	5, 016	8, 259	5, 820	6, 183	6, 297	6, 491	989	985
Kentucky Tennessee Alabama Mississlppi Arkansas Louisiana Oklahoma Texas	3, 125 1, 144 155 304 202 204 372 27, 056	172 288 202 288 410	256 212 330 531	256 202 368 690	3, 901 1, 344 184 274 190 418 886 46, 779	4, 175 1, 423 160 274 181 425 1, 034 48, 262	274 198 443 1, 170	651 266 47 95 43 89 51 3,767	683 260 49 90 43 90 54 3, 963
South Central	32, 652	34, 656	41,059	46, 905	53, 976	55, 934	61, 199	5, 009	5, 232
Montana Idaho Wyoming Colorado New Mexico Arizona Utah Nevada Washington Oregon California	6, 252 18, 438	15, 798 22, 338 8, 132 13, 084 6, 283 20, 093 8, 508 4, 998	26, 460 8, 877 14, 023 6, 200 20, 915	17, 425 27, 900 11, 300 14, 824 5, 978 23, 064	18, 156 26, 502 12, 269 15, 230 5, 820 20, 655	7, 944 6, 17	34, 560 13, 541 16, 632 5, 760 23, 056 8, 720 6, 336	2, 560 940 1, 910 1, 025 2, 144 1, 050	2, 628 1, 070 2, 013 1, 0 0 2, 208 1, 105 510 1, 970
Western	152, 615	<del></del>		187, 435	188, 277	204, 771	213, 976	19, 192	20, 032
United States	252, 832	268 900	289, 909	314, 588	327, 566	351, 521	369, 315	33, 454	34, 888

See footnotes at end of table.

Table 362.—Wool, shorn: Estimated production, by States, 1925-1931—Continued

		Numb	er of fle	eces 1			V	Veigh	t per	fleece	1	
State and division	1927	1928	1929	1930	1931	1925	1926	1927	1928	1929	1930	1931
	Thou- sands	Thou-	Thou- sands	Thou-	Thou-	Lbs.	Lbs.	Lbs.	<i>Lbs.</i> 6. 3	Lbs.	Lbs.	Lha.
Maine	84 18	84 19	77 17	76 18	78 17	6. 5 6. 4	6. 5 6. 5	6. 5 6. 5	6.4	6. 1 6. 4	6. 2 6. 3	
New Hampshire Vermont	40	40	39	38	37	7. 2	7.3	7. 3 6. 3	6. 7 6. 2	6.7	6.7	6.8
Massachusetts	10	10	10	11	10 2	7. 2 6. 2 6. 2 5. 9	6.2	6.3	6.2	5.9 5.9	6.0 6.2	5. 9 5. 9
Rhode Island	2 7	2 8	2 7	2 8	ŝ	5. 9	6.2 6.1 7.3	6. 2 5. 9 7. 3	6. 1 5. 7	5. 7 7. 2	5.8	5.7
New York	440	430	430	432	412	7. 3	7.3	7. 3	7.2	7. 2	7.2	7.3
Rinde Island Connecticut New York New Jersey Pennsylvania	364	397	403	420	433	6. 2 7. 5	6.3 7.3	6. 3 7. 5	6. 1 7. 3	6. 1 7. 4	6. 1 7. 4	6. 2 7. 5
Pennsylvania	304	387										
North Atlantic	970	995	991	1,011	1,005	7. 3	7.2	7. 3	7.1	7.1	7.1	7. 2
Ohio	1, 910 530	1, 802 603	1, 810 625	1,860 660	1, 818 673	8.1	8.2 7.4	8. 2 7. 4	8. 2 7. 3	8. 1 7. 2	8. 1 7. 2	8.5
IndianaIllinois	585	565	615	664	641	7.3 7.2	7. 2	7. 2	7.4	7.3	7.3	7.4
Michigan Wisconsin		1, 070 375	1, 060 385	1,050	1,015	8. 0 7. 5	8.0	8. 2 7. 6	8. 2 7. 7	8.0 7.5	8.0 7.5	
Wisconsin	365	375		430	425							
North Central, East	4, 420	4,415	4, 495	4, 664	4, 572	7.8	7.9	7.9	7. 9	7.8	7.8	8. 1
Minnesota	533	595	680 850	784 955	825 990	7. 8 8. 0	7. 9 8. 0	7. 9 8. 0	7.9 8.0	7. 9 8. 0	7.8 8.0	
Iowa	735 860	790 840	1, 010	1,070	1,090	6.5	6.4	6.4	6.8	6.6	6.4	
North Dakota	420	500	622	737	825	8.2	8.3	8.7	8.5	8.5	8.5	8. 6
South Dakota Nebraska	645 320	732 340	851 365	939 400	1, 050 380	7. 8 7. 3	8.2 7.4	8. 4 7. 5	8.4 7.7	8.2	8.3 7.5	8.4 7.3
Kansas	356	400	470	498	475	6.8	6.6	6. 7	6.8	7. 4 6. 7	6.8	6.8
North Central, West	3, 869	4, 197	4, 851	5, 883	5, 635	7.4	7. 5	7. 6	7.7	7. 6	7. 6	7. 7
North Central	8, 289	8, 612	9, 346	10, 047	10, 207	7. 6	7.7	7. 8	7.8	7.7	7.7	7 8
						6. 0		6.0	6. 1		6. 2	
Maryland	2 81	87	3 89	92	89	6. 1	6.3	6.3	6. 1	6.3 6.3	6.3	6.0
Virginia	348	393	421	440	445	4.7	6.3 5.2	6.3 5.2 5.3	5.0	5.0	5.0	5.0
West Virginia	427	490 76	528 85	547 80	570 82	5. 2 4. 5	5.3	4.8	5.4	5.3	5. 2 4. 7	5.8
South Carolina	73 12	13	12	12	12	4.0	4.1	4. 2	4.2	4.8	4.8	4.8
Delaware Maryland Virginia West Virginia North Carolina South Carolina Georgia Florida	35	36	34	33	33 37	3. 2 3. 0	8.4	3.6	3.4	3.4	3.4	3.4
		42	40	38				8.0		3. 1	3.0	3.0
South Atlantic		1, 140	1, 212	1, 245		4. 8		5. 1	5. 1	5. 1	5. 1	
Kentucky Tennessee Alabama Mississippi	762 273	810 814	830 320	835 331	800 348	4.8	4.8	4.8		4.7	5.0 4.3	
Alabama	48	50	52	47	42	3. 3	3.5	2.0	2.5	3. 5	3.4	3.4
Mississippi	80	80	83	83	83	3. 3 3. 2	3.5	3.2	3. 5 3. 2	3. 3	3.3	3.8
ArkansasLouisianaOklahomaTexas	45 100	44 115	42 130	42 125		4.7 3.3		4.7	4.6	4. 5 3. 2		
Oklahoma	69	92	123	136	1.50	7. 3	7.6	7. 7	3.2 7.8	7. 2	7.6	7. 8
	4, 526	4, 938	5, 680	6, 232	6, 836	7. 2	7.3	7.7	8. 1	8. 2	7. 7	7.8
South Central	5, 903	6, 443	7, 200	7, 831	8, 420	6. (	6.6	7. 0	7.3	7.4	7. 1	7. :
Montana Idaho Wyoming Colorado New Mexico	2, 806 1, 830	3, 100	3, 458	3, 740	3,784	8.6	8.9	8.8	8.7	9.0		9. 4
Wyoming	1,830	1,894	2,040	2, 040 3, 264	2.134	8.8	8.9	8.5	9.2	8.9	8.9	9.
Colorado	2, 973 1, 216	8, 100 1, 395	3, 155 1, 573	1,600	1.736	8. 8 7. 4	8. 5 7. 6	7 9	9. ( 8. 1	7.8	9. 1 8. 1 7. 2	9.6
New Mexico	2, 093 1, 000	2, 180	2, 145	2, 343	2,520	8.3	1 A 5	6.7	6.8	7.1	7. 2	G.
		980 2,480	970 2, 430	940 2,600			6. 1 9. 1	6.2	6. 1 9. 5	6.0	6.0	) G. (
Utah Nevada Washington	1,098	1, 144	1,010	993	1,090	7. 2	7.7	1 79	1 7 5	7.7	8.0	8.0
Washington	584	575	615	650	660	N 9. F	9.8	9. 8	9.8	8.9	9.5	9. (
Oregon California	2, 060 3, 280	2, 210 8, 469	2, 271 3, 472	2, 375 3, 694	2, 500 3, 887	8.8	9.3	9. 8 8. 8 7. 8	9. 2 7. 2	8. 6 7. 4	9. 0 7. 8	8.
	I				<u> </u>	-				-		.
Western	21, 240	22, 527	23, 139	24, 299	25, 491	8. (	8.2	8. 1	8.8	8.1	8.4	8.4
			23, 139 41, 948			-			-	-		-

Bureau of Agricultural Economics. All years shown, revised January, 1932.

<sup>&</sup>lt;sup>1</sup> In States where sheep are shorn twice a year, principally Texas and California, this figure covers wool per head of sheep shorn and not weight per fleece.
<sup>2</sup> Include fleeces taken at commercial feeding plants.
California figures include some fleeces taken from early lambs.

Table 363.—Wool: International trade, average 1925-1929, annual 1928-1930

				Calend	ar year			
Country	Average	1925-1920	19	28	19	20	198	30 1
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING								
COUNTRIES	1,000	1.000	1,000	1,000	1,000	1.000	1.000	1.000
	mounds	vounds	pounds	pounds	pounds	pounds	pounds	pound
ustralia <sup>2</sup>	739, 123	3,990	715, 028	6, 286	764, 760	3, 819	851,762	2,3
ustralia 2 rgentiua union of South Africa	284, 973	302	276, 463	355	281, 313	336	297,643	1
nion of South Airica	254, 431	576	201, 211	943	296, 917 234, 956 112, 620	701	281,898	2
Temper	220, 228 117, 856	103	226, 805 117, 771	89	234, 900	73	197, 240	
lhina	58, 272	568	73, 623		59, 864	444		2
lew Zealand Truguay China Sritish India	50, 373	27,843	57, 649	32, 693	56,774	28, 128	32, 193	14, 4
hile	26, 196	435	26, 689	584	23, 519	554	20,051	
		3,632	26, 526	3, 815	14, 481	3, 646	18, 592	2.0
Aorocco rish Freo State ersia *	13, 345	. 0	13, 038	. 0	7, 195	1 0	4,024	
rish Free State	12,706	1, 282	12, 284	865	12 114	1.043	2 6, 600	7
'ersia *	11,918	1, 380 1, 643	12, 192 9, 187	974 1, 925	11, 713 11, 317	1, 212 1, 400		1.6
Jungary Brazil	11,715 11,021	7,020	10, 160	1, 920	11, 392	1, 400	8, 718 16, 229	1,0
eru	10, 760		12, 411	2	10, 569	4	7, 151	
nain	9.715	4, 918	7, 523	6, 509	10, 674	6, 111	6,051	7,3
gypt and Sudan	9,715 3,997	4 - 127	3,930	* 221	4.790	4 - 206	2, 288	4 -
pain gypt and Sudan unis	2, 982	1, 383	4, 216	1, 423	2, 503			1,2
Total		47 000	1, 866, 706	ka 000	1, 931, 473	46 001	1, 954, 879	80, 50
TOM1	1, 010, 000	41,020	1, 000, 100	00,000	1, 931, 4/3	720, 801	1, 90%, 018	00,0
PRINCIPAL IMPORTING						ĺ		
COUNTRIES								l
ranca	53, 286	633,028	59, 924	A12 072	64, 820	888 818	52 400	688, 5
Tance Inited Kingdom	54, 037	633, 028 473, 061	48, 007	612, 072 462, 691	51, 984	686, 613 503, 232	52,609 32,661	513, 6
termany Inited States.	24, 109	361.447	26, 542	380, 649	34, 973	376, 437	23, 884	347, 9
Inited States.	322	288, 346 135, 887	485	244, 553	239	280.371	162	163.7
Belgium	19,091	135, 887	84, 778	144, 701	85, 955	171, 261 120, 248	83, 192	163, 1
talyapan	7, 188	99, 134	8, 358	106, 919 116, 194 82, 269	6, 398	120, 248	4, 314	119, 5
apan	2 4, 024	93, 489 46, 095	0 2 179	92 280	1112		30	
Russia zechoslovakia oland witzerland	3, 381	35, 889	3, 195	87, 922	3, 164	43, 454	1,813	
oland	1, 398	30.255	1, 545	30, 487	908	1 35.OO3		32, 4
witzerland	45	17, 404	35	30, 487 17, 202	47	17, 827	50	19.7
Lustria	1 978	16, 490	832	16, 456	499	19, 506	390	16, 4
Janada	7, 307	13, 930	8, 351	14, 271	6,090	19 000	4, 382	9, 4
weden Vetherlands Vugoslavia	241	10,826	874	11,829	274	12, 512 12, 119	234	10, 5
Vetherlands	2, 830	10, 518	2, 924	10, 457	3, 244	12, 119	2, 268	16, 7
( ugosiavia Rumania	117 1, 287	5, 589 5 4, 011	243 1,636	8, 017	142 2,393	4, 578 3 5, 305	67 2 262	7, 2 3, 8
Sumana Denmark	355	2,808	534	2.730	269	8, 656	94	
Maland		2, 808 2, 806	J02	2,730 3,531	~00	2,587		2.0
Iniparia	1 8	2,699	11	2.715	0	3,760	3 35	2.7
reece	641	2,003	523	1,477	616	2, 615	624	
Yorway	601	1,812	1, 118	1,717	641	1, 542	214	1,7

Bureau of Agriculturul Economics. Official sources except where otherwise noted. "Wool" in this table includes washed, unwashed, scoured, pulled wool, slipe, also hair—camel's, mohair, angora goat, eashmere goat, and alpaca. The following items have been considered as not within this classification: Carced, combod, dyod wool, flocks; sheep, lamb and goat skins with hair on, mill waste, noils and tops.

Preliminary.
International Yearbook of Agricultural Statistics.
Figures for Persia are for 12 months ended Mar. 21 of the year following year shown.
Excess of reexports over imports.

<sup>4-</sup>year average.

Table 367.—Wool, shorn: Estimated average price per pound received by producers
United States, 1922-1931

Year	Jan. 15	Feb.	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Weight- ed aver- age
1922. 1923. 1924. 1925. 1926. 1927. 1928. 1929. 1929. 1930.	Cents 18. 0 35. 3 36. 6 42. 8 38. 9 30. 9 33. 2 35. 9 27. 4 17. 4	Cents 22. 3 35. 3 37. 5 43. 2 37. 7 31. 1 34. 4 35. 9 25. 9 16. 4	Cents 25. 0 37. 3 38. 2 43. 0 34. 7 31. 3 35. 4 35. 5 23. 7 15. 9	Cents 24. 8 39. 2 38. 4 40. 8 33. 2 30. 4 35. 6 33. 8 21. 4 15. 6	Cents 29. 0 41. 7 37. 4 36. 9 32. 0 30. 1 37. 0 31. 3 19. 6 14. 4	Cents 32 8 41. 5 36. 0 35. 7 31. 4 30. 2 38. 7 30. 2 19. 2	Cents 32.5 38.3 34.3 39.4 31.9 30.7 37.6 29.4 19.2 12.7	Cents 31, 6 37, 0 33, 5 38, 1 31, 9 31, 2 37, 0 29, 2 19, 8 13, 1	Cents 31. 6 37. 1 35. 5 37. 8 32. 6 31. 2 36. 5 29. 0 20. 2 13. 2	Cenis 32, 2 36, 9 37, 3 37, 2 31, 6 30, 9 36, 0 28, 6 19, 6 12, 5	Cents 33. 2 36. 4 40. 1 37. 8 31. 6 31. 1 35. 9 28. 5 19. 0 13. 1	Cents 35. 3 36. 2 42. 2 39. 5 80. 1 32. 0 35. 6 27. 8 18. 4 12. 9	Cents 29, 8 38, 9 36, 9 38, 5 32, 5 30, 7 36, 7 30, 9 20, 3 13, 9

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by number of sheep Jan. 1, to obtain a price for the United States; yearly price obtained by using estimates of the division of crop and livestock estimates and the division of statistical and historical research.

Table 368.—Wool: Boston market: Average price per pound, 1922-1931 SCOURED BASIS, TERRITORY, GRADES 64'S, 70'S, 80'S (FINE STRICTLY COMBING)

Year	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver- age
1922 1923 1924 1925 1926 1926 1927 1927 1928 1929 1930	Cents 97 143 139 168 127 110 116 114 82 68	Cents 110 144 139 164 110 116 110 79 66	Cents 110 144 142 153 118 110 116 108 78 66	Cents 109 149 138 138 116 109 117 104 76 66	Cents 127 153 135 126 112 108 119 100 75 64	Cents 134 150 129 130 110 108 120 97 76 62	Cents 135 144 130 137 116 111 120 94 76 62	Cents 131 137 137 132 116 111 115 94 76 64	Cents 130 132 142 129 116 111 112 93 76 62	Cents 134 130 147 128 116 112 112 90 75	Cents 139 130 154 131 114 112 113 88 73 59	Cents 140 134 164 131 110 112 114 84 72 59	Cents 125 141 141 139 116 110 116 98 76 63

# SCOURED BASIS, TERRITORY, GRADE 58'S (THREE-EIGHTS BLOOD STRICTLY COMBING)

$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	8 106 3 113 9 110 1 92 4 91 4 104 2 92 8 63
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# GREASE BASIS, OHIO AND SIMILAR, GRADE 56'S (THREE-EIGHTHS BLOOD STRICTLY COMBING)

1922 1923 1924 1925 1925 1926 1927 1928 1928 1929 1930	36 55 55 70 54 45 50 56 89 26	39 56 56 69 53 45 52 55 86 25	40 58 57 66 49 45 52 54 34 24	38 56 55 55 46 44 53 50 32 23	42 56 53 46 44 42 55 45 29 22	47 57 49 49 43 42 57 44 30 22	46 56 48 53 44 43 56 45 30 22	46 54 53 52 44 44 55 45 30 23	47 53 55 50 44 45 55 45 30 24	49 52 59 52 45 46 55 48 24	53 53 63 54 46 47 56 44 29	54 54 69 54 45 48 56 42 28 24	45 55 56 56 48 45 54 48 31 24
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Bureau of Agricultural Economics. 1922-1923 average of weekly range quotations from the Boston Commercial Bulletin, and 1924-1931 prices from the livestock and meat reporting service of the bureau.

Table 369.—Goats and mohair: Estimates 1 of goats clipped, mohair clipped, and average clip per goat (principal producing States), 1920-1931

### GOATS CLIPPED

State	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Texas <sup>2</sup>	Thou- sands 1, 834 124 145 72 113 58	Thou- sands 1, 984 128 145 74 115 60	Thou- sands 1,750 110 152 59 105 55	Thou- sands 1, 797 110 160 57 103 53	Thou- sands 2,008 127 165 57 101 60	Thou- sands 2, 020 120 162 58 110 61	Thou- sands 2, 550 135 165 56 115 61	Thou- sands 2, 640 165 185 52 115 63	Thou- sands 3, 070 170 190 44 125 68	Thou- sands 3, 200 186 200 42 120 68	Thou- sands 3, 518 209 225 40 120 67	Thou- sands 3, 570 236 250 39 115 68
Total	2, 346	2, 506	2, 231	2, 280	2, 518	2, 531	3, 082	3, 220	3, 665	3, 814	4, 179	4, 278

### MOHAIR (INCLUDING KID HAIR) PRODUCED

Texas	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
	6,786	7,607	6,838	7,352	7, 996	9,100	10, 700	11,600	13,500	14, 155	14,800	16,400
	397	422	352	374	457	444	473	611	629	717	815	933
	464	479	517	560	611	599	594	703	741	800	900	1,000
	230	214	207	211	217	220	207	187	158	147	140	136
	452	460	431	422	414	462	483	483	525	492	480	472
	145	150	143	148	162	171	171	176	178	165	168	170
Total	8, 474	9, 362	8, 488	9, 067	9, 857	10, 996	12, 628	13, 760	15, 731	16, 476	17, 303	19, 111

## AVERAGE CLIP PER GOAT CLIPPED :

Toxas New Mexico Arizona California Oregon Missouri	Lbs. 3.7 3.2 3.2 3.2 4.0 2.5	Lbs. 3.8 3.3 3.3 4.0 2.5	Lbs. 3.9 3.2 3.4 3.5 4.1 2.6	Lbs. 4.1 3.4 3.5 3.7 4.1 2.8	Lbs. 4 0 3. 6 3. 7 3. 8 4. 1 2. 7	Lbs. 4.5 3.7 3.8 4.2 2.8	Lbs. 4.2 3.5 3.6 3.7 4.2 2.8	Lbs. 4.4 3.7 3.8 3.6 4.2 2.8	Lbs. 4.4 3.7 3.9 3.6 4 2 2.7	Lbs. 4.4 3.9 4.0 3.5 4.1 2.5	Lbs. 4, 2 3, 9 4, 0 3, 5 4, 0 2, 5	Lbs. 4.6 4.0 4.0 3.5 41 2.5
Average, 6 States_	3. 6	3. 7	3.8	4.0	3. 9	4.3	4.1	4.3	4.3	4.3	4.1	4. 5

Bureau of Agricultural Economics.

Table 370.—Imported meat and meat products, federally inspected and passed, United States, 1921-22 to 1930-31

Year beginning July 1—	Chilled and me		Canned and	Other meat	Total weight
	Beef	Other	cured meats	products	weight
1921-22 1922-23 1922-24 1924-25 1925-26 1925-27 1927-28 1928-29 1928-29 1928-29	Pounds 16, 875, 389 26, 999, 968 18, 105, 128 5, 612, 600 9, 975, 389 14, 956, 143 38, 168, 121 58, 086, 288 23, 909, 708 2, 612, 713	Pounds 18, 938, 148 12, 871, 364 8, 489, 135 41, 827, 557 12, 402, 230 22, 508, 681 18, 880, 547 15, 704, 658 6, 783, 637 1, 314, 170	Pounds 5, 101, 764 9, 635, 315 10, 648, 605 12, 857, 043 19, 258, 401 43, 714, 607 63, 189, 480 89, 511, 853 98, 128, 169 23, 854, 583	Pounds 998, 195 1, 341, 067 1, 391, 060 2, 877, 640 3, 144, 968 5, 454, 741 12, 102, 635 11, 563, 215 8, 065, 195 5, 651, 509	Pounds 41, 913, 496 49, 847, 714 38, 633, 931 33, 174, 840 44, 780, 958 86, 634, 172 132, 340, 783 169, 865, 014 136, 886, 709 33, 423, 975

Bureau of Animal Industry.

Figures for 1925-1930 are revisions of department's estimates previously published.
 Most goats clipped twice a year. In Texas, kids are clipped in the fall of year of birth. Figures include both goats and kids clipped.
 In States where goats are clipped twice a year figures include both spring and fall clip.

Table 371.—Livestock: Number of animals slaughtered at federally inspected plants and number of whole carcasses condemned, 1921-22 to 1930-31

	Cat	tle	Cal	ves	She	ер	Go	ats	Sw	ine	Ho	rses	a
Year beginning July—	Slaughter	Condemned	Slaughter	Condemned	Slaughter	Condemned	Slaughter	Condemned	Slaughter	Condemned	Slaughter	Condemned	Total slaughter
1921-22 1922-23 1922-24 1924-25 1925-26 1925-26 1928-27 1927-28 1928-29 1928-29 1928-30	Thou- sands 7, 871 9, 030 9, 189 9, 774 10, 098 10, 050 9, 040 8, 284 8, 281 8, 209	Thou- sands 55. 2 73. 3 83. 9 92. 1 103. 5 69. 4 61. 9 59. 5 52. 4	Thou-sands 3, 924 4, 338 4, 668 5, 185 5, 312 5, 080 4, 774 4, 526 4, 491 4, 732	Thou- sands 11.4 11.8 12.7 11.1 11.9 10.9 8.9 9.5 9.1	Thou-sands 11, 968 11, 404 11, 505 12, 203 12, 354 12, 894 12, 984 13, 769 15, 307 17, 300	Thou- sands 10 5 13.3 12.9 12.7 14.5 16.4 20.1 22.9 18.5		Thou-sands 0.0 .1 .3 .1 .1 .1 .1	Thou- sands 89, 416 48, 600 54, 416 48, 480 40, 443 42, 650 48, 347 47, 164 46, 689 44, 021	Thou-sands 160. 1 196. 3 232. 7 180. 4 143. 0 154. 2 139. 4 135. 4		Thou-sands 0.0 .0 .0 .1 .2 .3 .4 .5	Thou-sands 63, 196 73, 398 79, 814 75, 660 68, 289 70, 747 75, 273 73, 881 74, 926 74, 406

Bureau of Animal Industry.

Table 372.—Meat and meat products prepared under Federal inspection, 1921-22 to 1930-31

Year beginning July—	Pork placed in cure	Sausage	Canned meats	Larđ	Lard com- pounds and substi- tutes	Oleo prod- ucts	Oleo- mar- garine	All other products	Total
1921-22 1922-23 1923-24 1924-25 1925-26 1920-27 1920-27 1927-28 1928-30 1928-30	1,000 pounds 2,725,031 3,366,268 3,502,368 3,176,714 2,850,675 2,920,206 3,036,003 2,992,398 2,981,864 2,851,938	1,000 pounds 568,626 679,317 707,323 736,877 771,741 765,074 778,311 785,463 783,629 697,798	1,000 pounds 109,481 160,282 183,260 214,650 214,166 248,459 255,379 285,808 303,094 283,547	1,000 pounds 1,659,331 2,017,763 2,110,660 1,733,933 1,598,764 1,691,344 1,846,790 1,847,790 1,817,601 1,807,144 1,602,397	1,000 pounds 312,014 336,851 363,320 458,518 543,913 535,175 472,839 467,077 433,495 482,482	1,000 pounds 208,034 278,137 259,008 287,271 275,636 280,641 237,506 228,531 223,889 212,925	1,000 pounds 118,197 129,768 142,881 133,836 148,331 148,384 152,085 158,881 159,413 117,819	1,000 pounds 1,666,403 1,920,171 2,136,020 2,170,278 2,007,854 1,971,827 2,201,933 2,210,438 2,288,407 2,135,789	1,000 pounds 7,427,117 8,888,547 9,404,840 8,912,077 8,411,070 8,561,110 8,980,912 8,986,607 8,946,607 8,946,607 8,946,607

Bureau of Animal Industry. The above figures do not represent production, as a product may be inspected more than once in course of further manufacture.

<sup>&</sup>lt;sup>1</sup> The numbers of condemned carcasses are expressed in thousands and tenths; that is, the last figure represents hundreds.

Table 373.—Meat and meat products: International trade, average 1925-1929, annual 1928-1930

				Calenda	ar year			
Country	Average	1925–1929	19	28	19	29	193	01
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PEINCIPAL EXPORTING COUNTRIES	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Argentins United States Denmark	pounds 2, 028, 126 1, 421, 054 640, 468	pounds 465 147, 765 26, 692	pounds 1, 751, 434 1, 335, 802 721, 893 558, 807	pounds 613 194, 161 28, 549	pounds 1,701,510 1,448,801 681,512	pounds 427 217, 795 28, 429	pounds 1, 552, 620 1, 183, 014 875, 694 438, 879 514, 666 2 402, 247 344, 543 35, 045 288, 230 90, 303	pounds 323 97, 765 28, 156
Netherlands New Zealand Uruguay	534, 982 442, 571 396, 117	1, 102	341, 890	28, 549 180, 100 1, 062 0	458 530 428, 335 336, 659	158, 485 1, 198 0	438, 879 514, 666 2 402, 247	175, 253 1, 027 0
Canada Crazil Irish Free State	380, 162 144, 720 131, 003 105, 959	6, 691 27, 305 10, 511 66 964	116 959	8, 425 27, 179 10, 106 57, 194	81, 528 201, 914	7, 808 40, 774 6, 417 59, 541	344, 543 35, 045 288, 230 90, 303	4, 212 39, 835 6, 953 61, 470
Poland Sweden China	71, 019 61, 961 48, 376	27, 305 10, 511 66, 964 45, 836 46, 886 3, 672 4, 206 6, 733	176, 052 135, 551 64, 673 68, 596 44, 153	10, 106 57, 194 68, 364 44, 111 4, 385 1, 104	110, 625 68, 938 63, 262 41, 082	55, 447	106 227 87, 300 43, 906	61, 470 39, 861 50, 325 3, 563
Argentina United States Denmark Netherlands New Zealand Uruguay Australia 3 Canada Frazil Irish Free State Poland Sweden China China Chilo Hungary Yugoslavia Union of South Africa Rumania	40, 829 33, 182 27, 751 24, 581	4, 206 6, 733 9, 664 15, 656	46, 562 14, 864 21, 205 19, 090	10, 494	44, 991 19, 691 22, 364 27, 495	4,000 2,942 2,195 12,985 15,687	39, 452 32, 709 15, 566 32, 102 2 19, 093	3, 684 10, 264 11, 885
Rumania	21, 049 6, 553, 910	627, 737	\$ 11, 812 6, 234, 822	16, 640 (2) 683, 131	2 13, 755 6 134, 411	662, 979	2 19, 093 6, 101, 596	534, 580
Total berf Total pork Total mutton and lamb	2, 872, 975 2, 274, 327 607, 310	251, 128 150, 315 1, 430	2, 556, 147 2, 317, 847 582, 960 747, 868	254, 535 162, 847 1, 122	2, 434, 200 2, 272, 588 633, 358	228, 233 147, 748 962	2, 464, 614 2, 146, 363 736, 033	183, 771 128, 259 794
Total unclassified	799, 298			1, 122 244, C27	794, 235	286, 036	754, 586	221, 756
Total	6, 553, 910	627, 737	6, 234, 822	663, 131	6, 134, 411	662, 979	6, 101, 596	534, 580
COUNTRIES								
United Kingdom Germany France	127, 797 42, 080 62, 427	3, 827, 865 838, 653 299, 085	114, 738 48, 022 77, 572	3, 855, 378 703, 269 229, 425	112, 301 55, 142 73, 158	3, 708, 244 670, 475 176, 678	140, 094 78, 441 67, 952	3, 894, 405 570, 656 270, 023
Italy Bolgium Cuba	18, 680 60, 122 750	233, 627 213, 736 180, 592	13, 027 56, 402 1, 465	215, 229 168, 075 177, 609	10, 866 39, 684 2, 285	230, 546 184, 671 168, 102	14, 482 36, 423 2, 231 9, 969	206, 397 194, 705 132, 935
Austria Czechoslovakia Japan	8, 495 9, 837 115	124, 462 101, 778 68, 636	11, 413 10, 544 368	85, 941 68, 918	9, 915 10, 602 208	121, 616 100, 048 70, 088	8,634	105, 192 83, 045 71, 263
United Kingdom Germany France Italy Belgium Cuba Austria Czechoslovakia Japan Mexico Norway Spain Switzerland Finland Philippine Islands	7, 200 3, 107 6, 116 3, 383	65, 814 36, 970 31, 148 30, 242	6, 085 3, 552 3, 263 3, 335	87, 376 33, 640 31, 239 30, 850	4,017 3,957 2,719	2, 520 30, 705 34, 883 31, 468	1, 135 2, 779 5, 342	95, 349 28, 261 27, 308 30, 469
Finland Philippine Islands British Malaya	4, 565 0 2, 336	19,972 19,812	1,819	26, 477 19, 767 16, 529	3,258 1,297 0 2,249	20, 245 21, 607 16, 323	3, 019 2, 943 0 1, 985 978	13, 519 14, 845 13, 628
Philippine Islands British Malaya British India Peru Algeria Egypt	2, 336 1, 254 590 1, 820	15, 306 13, 250 12, 912 12, 557 7, 603	2, 563 1, 390 1, 180 2, 122	11, 158 10, 707 13, 082	2, 249 1, 247 1, 194 1, 644	12, 813 11, 029 13, 040 8, 599	1,728 1,399	12,819
Total		6, 153, 520	358, 992	8, 070 5, 920, 321	335, 890	5, 633, 700	108 379, 780	4, 689 5, 783, 627
Total beef Total pork Total mutton and lamb	126, 843 32, 982	2, 696, 113 2, 163, 324	125, 886 29, 532 3, 027	2, 465, 322 2, 172, 953	105, 541 27, 523	2, 254, 639 2, 093, 663	160, 937 34, 532	2, 241, 949 2, 128, 210 796, 005 617, 468
Total mutton and lamb Total unclassified	126, 843 32, 982 4, 185 196, 808	2, 696, 113 2, 163, 324 680, 358 613, 727	3, 027 200, 547	2, 465, 322 2, 172, 953 688, 845 593, 201	105, 541 27, 523 2, 715 200, 111	2, 254, 639 2, 093, 663 701, 848 583, 550	160, 937 84, 532 5, 846 178, 465	796, 005 617, 468
Total	360, 818	6, 153, 520	358, 992	5, 920, 321	335, 890	5, 633, 700	379, 780	5, 783, 627

Bureau of Agricultural Economics. Official sources except where otherwise noted.

Preliminary.
 International Yearbook of Agricultural Statistics.
 Year ended June 30.
 4-year average.

Table 374.—Meats, western dressed, fresh and smoked: Average wholesale price per 100 pounds at Chicago and New York, by years, 1929-1931

### BEEF AND VEAL

			(	hicag	,			New York						
		St	eer be	ef						Steer	beef			
Year	Oh	oice	Go	ođ	500 Ф	Good	pq	Ch	oice	Go	od.	, 500 up	Good	pq
	700 pounds up	550 to 700 pounds	gn dn dn	550 to 700 pounds	Medium, 6 pounds up	Cow beat, G	Vealers, <sup>1</sup> Good	700 pounds up	550 to 700 pounds	spunod 001	550 to 700 pounds	Medium, poundsu	Cow beef, G	Vealers, 1 Good
1929 1930 1931	Dolls. 21. 93 18. 83 14. 51	Dolls. 22. 67 19. 64 15. 10	20. 71 17. 16	21. 26 17. 45	18. 96 15. 34	17. 28 13. 68	17.90	22. 96 19. 53	23. 22 19. 95	17.86	21, 60	15.77	17. 94 14. 56	20.39

### PORK OUTS

			Chi	cago			New York					
	F	resh po	rk	Cur	ed pork lard	and	F	resh po	rk	Cur	ed pork lard	and
Year	Ham, 10 to 14 pounds	Loins, 12 to 15 pounds	Shoulders, New York style, skinned, 8 to 12 pounds	Hams, smoked, regular, No. 2, 14 to 16 pounds	Bacon, No. 1, smoked, dry cure, 6 to 8 pounds	Lard, refined (hard-wood tubs)	Hams, 10 to 14 pounds	Loins, 12 to 15 pounds	Shoulders, New York style, skinned, 8 to 12 pounds	Hams, smoked, regular, No. 2, 10 to 12 pounds	Bacon, No. 1, smoked, sweet-pickle cure, 8 to 10 pounds	Lard, refined (hard- wood tubs)
1929 1930 1931	Dolls. 21. 29 19. 66 12. 99	Dolls. 21. 17 19. 61 14. 00	Dolls. 16. 07 15. 36 10. 05	Dolls. 24. 10 23. 08 16. 76	Dolls. 30. 16 30. 58 24. 30	Dolls. 12. 97 12. 02 9. 02	Dolls. 23. 12 22. 40 16. 12	Dolls. 21. 08 20 40 15. 00	Dolls. 17. 72 16. 74 11. 91	Dolls. 23. 88 22. 64 17. 61	Dolls. 22. 21 23. 39 18. 41	Dolla. 13. 70 12. 57 9. 84

## LAMB AND MUTTON

			(	hicag	0		ı	New York						
			La	mb			, 70			La	mb			02 ,
Year	Ch	oice	Go	od	, 38	, 38 wn	Good, s down	Ch	oice	Go	ood	, 38	, 38 wn	Good,
	38 pounds down	39 to 45 pounds	38 pounds down	39 to 45 pounds	Medium, 3 pounds down	Common, 38 pounds down	Mutton, C	38 pounds down	39 to 45 pounds	38 pounds down	39 to 45 pounds	Medium, 38 pounds down	Common, 3 pounds down	Mutton, (
1929 1930 1931	Dolls. 27. 73 21. 18 17. 51	20, 69	Dolls. 26, 57 19, 58 16, 04	26.30 19.22	Dolla. 24.70 17.33 14.07	Dolls. 22.57 14.76 12.00	Dolls. 14. 78 10. 83 8. 62	Dolls. 28. 58 21. 88 18. 17	Dolls. 27. 75 21. 34 17. 88	Dolls. 27, 29 20, 75 16, 89	Dolla. 26. 52 20. 25 16. 63	19.00	Dolls. 23. 61 17. 08 13. 11	14. 65 11. 33

Bureau of Agricultural Economics. Compiled from data of the livestock and meat-reporting service the bureau. Earlier data in 1927 Yearbook, pp. 1050-1055, and in 1928 Yearbook, pp. 964-966.

<sup>1</sup> Hide on

Table 375.—Hides, packer: Average price per pound at Chicago, 1922-1931

			Steers				Cows		Bulls		
Calendar year	Heavy native	Heavy Texas	Light Texas	Butt branded	Colo- rados	Heavy native	Light native	Branded	Native	Branded	
1922. 1923. 1924. 1925. 1927. 1927. 1928. 1929. 1930.	Cents 17. 83 16. 46 14. 67 15. 96 14. 08 19. 28 23. 85 16. 98 13. 87 9. 06	Cents 16. 57 14. 79 13. 82 15. 08 13. 38 18. 21 22. 91 16. 08 13. 76 8. 96	Cents 15. 29 13. 77 12. 80 14. 06 12. 67 17. 49 22. 26 15. 16 12. 55 8. 34	Cents 16. 51 14. 89 13. 80 15. 16 13. 34 18. 23 22. 95 16. 11 13. 73 8. 96	Cents 15. 59 13. 86 12. 79 14. 12 12. 82 17. 74 22. 26 15. 39 13. 18 8. 48	Cents 16. 10 14. 21 12. 95 14. 82 12. 71 18. 08 22. 96 11. 78 8. 04	Cents 15. 16 12. 94 12. 29 14. 62 13. 11 18. 66 22. 63 15. 75 11. 71 8. 43	Cents 13. 47 11. 11 10. 41 13. 30 12. 05 17. 26 21. 79 14. 86 11. 19 7. 76	Cents 11. 96 11. 69 10. 14 11. 98 9. 98 14. 09 17. 64 11. 42 8. 30 5. 53	Cents 10. 15 9. 89 8. 79 10. 29 8. 50 12. 88 16. 62 10. 17 7. 30 4. 78	

Bureau of Agricultural Economics. Compiled from annual reports of the Chicago Board of Trade Data 1898–1919 available in 1925 Yearbook, p. 1199, Table 610.

TABLE 376.—Hides, country: Average price per pound at Chicago, 1922-1931

Calendar year	Ex- tremes	Heavy steers	Heavy cows	No. 1 buffs	No. 2 buffs	Bulls	Country packer brands	Country brands	No. 1 calf- skins	No. 1 kip- skins
1922 1923 1924 1925 1926 1927 1928 1929 1930	Cents 12.93 11.65 11.86 14.41 13.46 18.60 22.04 14.98 11.18 7.77	Cents 12. 03 11. 39 11. 31 12. 94 11. 63 16. 02 18. 53 12. 09 8. 50 6. 02	Cents 10. 85 10. 43 9. 24 11. 64 9. 54 14. 85 18. 05 11. 55 8. 40 5. 61	Cents 10. 86 10. 45 9. 63 12. 26 10. 70 16. 26 19. 71 12. 82 9. 14 6. 32	Cents 9.52 9.26 8.63 11.25 9.70 15.26 18.71 11.82 8.14 5.32	Cents 8, 23 8, 93 7, 86 9, 46 8, 63 11, 49 14, 88 8, 92 5, 90 3, 99	Cents 12.53 10.12 9.81 12.52 10.52 10.52 11.54 19.18 9.49 6.70	Cents 8. 42 8. 70 8. 23 10. 54 9. 00 13. 89 17. 38 10. 80 7. 73 5. 05	Cents 18.95 17.18 20.39 21.88 18.02 20.47 27.84 20.72 17.43 11.81	Cents 17, 29 15, 42 16, 62 18, 12 16, 12 19, 93 18, 72 15, 92 10, 42

Bureau of Agricultural Economics. Compiled from annual reports of the Chicago Board of Trade.

Table 377.—Meats and lard: Estimated total production and per capita consumption in United States

		P	roductio	n			Per	capita c	onsumpt	ion	
Calendar year	Beef	Veal	Lamb and mutton	Pork (excl. lard)	Lard	Beef	Veal	Lamb and mutton	Pork (excl. lard)	Total meats	Lard
1900	5,606 5,779 6,075 6,641 7,279 6,758 6,713	Million pounds 285 340 384 425 4454 589 573 632 632 632 637 597 598 491 443 797 792 862 962 97 797 9862 961 960 867 814 883	Million pounds 517 538 561 545 555 555 602 603 732 7731 7612 608 473 493 603 559 626 555 571 589 643 643 643 643 643 653 552 656 656 656 6571 659 643 644 6671 6699 820	Milliom pounds 5, 915 5, 895 5, 887 5, 748 5, 970 6, 024 6, 506 6, 507 6, 622 6, 530 7, 854 7, 832 6, 877 7, 832 6, 877 7, 832 8, 800	Million pounds 1, 614 1, 496 1, 596 1, 596 1, 594 1, 596 1, 681 1, 673 1, 681 1, 673 1, 681 1, 675 1, 587 2, 039 2, 114 2, 778 2, 783 2, 784	Pounds 67.8 69.0 68.5 76.6 77.6 77.5 75.1 67.7 67.7 67.7 67.7 67.8 68.5 56.5 68.6 61.6 61.6 61.6 61.6 61.6 61.6 61.6	Pounds 3.4.4.7.4.9.8.4.8.1.6.3.8.5.4.7.6.0.8.8.1.6.3.8.5.4.7.7.8.8.8.7.7.8.8.8.6.6.8.6.6.8.6.6.8.6.6.8.8.8.8	#8900285543648154316785902225468867.7.66.666.6.6.7.7.6.6.4.5.5.5.5.5.5.5.5.5.5.5.5.5.5.5.5.5	Pounds 64.7 0 65.8 56.8 55.8 56.8 55.8 55.8 55.8 55.8	Pounds 142.8 142.8 147.2 148.3 147.2 148.3 149.2 141.6 146.5 137.4 130.1 130.0 136.8 133.3 149.0 143.7 143.7 143.7 143.7 143.7 143.7 143.7 143.7 143.7	Pounds 18. 29 11. 9 11. 12. 4 10. 00 11. 12. 5 11. 5 11. 14 11. 2 12. 9 13. 6 11. 7 13. 3 14. 2 15. 3 16. 3 17 18. 3

Table 378.—Horses and mules: Number and value on farms in the United States, January 1, 1910-1932

		Horses			Mules	
Year	Number	Value per head	Farm value	Number	Value per head	Farm value
1910. 1911. 1912. 1913. 1914. 1916. 1916. 1917. 1918. 1919. 1920. 1921. 1922. 1923. 1924. 1925. 1928. 1927. 1928. 1927. 1928. 1929. 1930. 1931. 1931. 1932.	20, 567 20, 962 21, 195 21, 155 21, 210 21, 555 21, 482 20, 092 18, 760 18, 760 16, 640 16, 067 15, 368 14, 768 14, 763 14, 763 13, 684	Dollars 108, 03 111, 46 105, 94 110, 77 109, 32 103, 33 101, 60 102, 89 104, 24 98, 45 98, 45 71, 05 70, 51 66, 42 66, 63 69, 86 69, 86 60, 83 60, 83 53, 37	7,000 dollars 2,142,524 2,252,604 2,278,222 2,201,004 2,149,786 2,190,102 2,149,786 2,182,307 2,246,970 2,246,970 1,038,447 1,037,477,873 1,135,967 1,038,442 1,049,442 970,500 984,763 988,983 985,964 795,541 676,698	Thousands 4, 3210 4, 323 4, 386 4, 449 4, 479 4, 583 4, 723 4, 873 4, 873 4, 875 6, 896 5, 772 5, 897 5, 896 5, 908 5, 908 5, 908 5, 908 5, 908 5, 908 5, 908 5, 908 5, 908 5, 908 5, 908	Dollars 120, 20 126, 92 120, 51 124, 31 123, 31 113, 38 118, 15 128, 81 136, 83 148, 25 117, 37 88, 99 86, 86 85, 89 82, 91 81, 51 74, 50 70, 79 82, 39 83, 76 90, 17 60, 69	1,000 dolları; 500, 044 554, 365 526, 667 545, 241 551, 041 552, 834 558, 000 627, 672 672, 922 838, 530 677, 477 518, 558 512, 007 507, 432 490, 666 481, 165 481, 165 481, 263 482, 181 450, 588 452, 822 449, 469, 473 360, 473

Bureau of Agricultural Economics. Estimates of the crop-reporting board.
Figures for earlier years are shown in 1923 year book. Figures for the years 1920-1931 were revised January, 1932.

TABLE 379.—Horses: Price per head received by producers, United States, 1922-1931

Year	Jan. 15	Feb.	Mar. 15	Apr. 15	Мау 15	June 15	July 15	Aug. 15	Sept.	Oci. 15	Nov. 15	Dec. 15	Weighted average
1922 1923 1924 1925 1926 1928 1927 1928 1929 1930	Dolls. 82 81 73 73 75 73 77 77 77	Dolls. 84 85 74 78 80 77 82 79 77 67	Dolls. 86 85 75 81 82 79 85 83 78 69	Dolls. 87 86 76 83 84 80 85 55 99 69	Dolls. 89 88 78 82 84 81 86 85 79	Dolls. 88 87 77 81 83 80 86 84 77 67	Dolls. 88 85 77 81 82 80 85 84 73	Dods. 86 83 79 80 80 80 84 82 70 62	Dolls. 84 82 78 77 78 78 82 82 69	Dolls. 81 80 77 76 77 76 50 79 68 58	Dolls. 79 78 76 75 75 75 75 75 77 78 66 57	Dolls. 79 75 78 74 78 75 78 77 64 50	Dolls. 84 82 70 78 79 78 82 81 80

Bureau of Agricultural Economics. Based on returns from special-price reporters. Monthly prices, by states, weighted by number of horses Jan. 1, to obtain a price for the United States; yearly prices obtained by weighting monthly prices by receipts at public stockyards.

Table 380.—Mules: Price per head received by producers, United States, 1926-1931

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	Мау 15	June 15	July 15	Aug. 15	Sept.	Oct. 15	Nov. 15	Dec. 15	Weighted average
1928 1927 1928 1929 1930 1981	\$92 83 93 94 93 74	\$96 88 97 96 94 76	\$97 91 100 99 95 78	\$100 92 102 101 96 80	\$99 91 102 101 95 79	\$99 92 102 100 94 77	\$96 91 101 99 88 73	\$95 90 100 96 80 70	\$94 90 96 96 78 67	\$90 90 96 96 98 78 65	\$85 91 94 94 77 65	\$85 91 93 93 74 68	\$94 90 96 96 91 74

Bureau of Agricultural Economics. Based on returns of special-price reporters. Monthly prices by States, weighted by number of mules Jan. 1, to obtain a price for the United States.

<sup>&</sup>lt;sup>1</sup> Preliminary.

Table 381.—Horses and horse colls: Estimated number on farms and value per head, by States, January 1, 1928-1932

Nebraska         788         772         768         769         697         60. 00         61. 00         52. 00         43. 00           Kansas         788         788         788         788         768         699         685         43. 00         49. 00         48. 00         38. 00         37. 00           North Central         8, 398         8, 146         7, 929         7, 699         7, 468         70. 34         73. 76         73. 85         63. 93         56. 07           Delaware         20         19         18         17         17         79. 00         90. 09         93. 00         82. 00         64. 00           West Virginia         221         212         205         196         187         70. 00         78. 00         88. 00         88. 00         68. 00         88. 00         68. 00         88. 00         68. 00         88. 00         68. 00         88. 00         68. 00         68. 00         88. 00         68. 00         68. 00         68. 00         68. 00         68. 00         68. 00         68. 00         68. 00         68. 00         68. 00         68. 00         68. 00         68. 00         68. 00         68. 00         68. 00         68. 00         68. 00 </th <th></th> <th></th> <th></th> <th>, 0 676</th> <th></th> <th></th> <th>1000</th> <th></th> <th></th> <th></th> <th></th>				, 0 676			1000				
1928   1929   1930   1931   1932   1932   1928   1929   1930   1931   1932   1934   1935   1936   1931   1932   1936   1931   1932   1936	State and division		1	Number	· 			Value	e per he	ad 1	
Maino		1928 2	1929 2	1930 ²	1931 2	1032 8	1928	1929	1930	1931	1932
Malno         74         67         63         85         57         135, 00         140, 00         143, 00         115, 00         115, 00         115, 00         116, 00         140, 00         143, 00         120, 00         120, 00         120, 00         120, 00         120, 00         120, 00         120, 00         120, 00         120, 00         120, 00         120, 00         120, 00         120, 00         120, 00         120, 00         130, 00         130, 00         160, 00         160, 00         120, 00         120, 00         130, 00         130, 00         160, 00         160, 00         120, 00         120, 00         130, 00         130, 00         160, 00         120, 00         130, 00         160, 00         120, 00         130, 00         160, 00         160, 00         120, 00         130, 00         140, 00         <		Thou-									
New Hampshire	Maine	74						140, 00	143,00		
New Jersey. 449 430 831 183 00 121.00 122.00 112.00 1107.00 Pennsylvania. 320 312 313 118.00 121.00 122.00 112.00 1107.00 Pennsylvania. 320 320 827 326 327 328 321 112.00 112.00 1107.00 104.00 104.00 105.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.0	New Hampshire		23	21	19		120.00	121.00	127.00	113.00	95.00
New Jersey. 449 430 831 183 00 121.00 122.00 112.00 1107.00 Pennsylvania. 320 312 313 118.00 121.00 122.00 112.00 1107.00 Pennsylvania. 320 320 827 326 327 328 321 112.00 112.00 1107.00 104.00 104.00 105.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.0	Vermont	56	55		51	50	119.00	124.00	131.00	109, 00	102.00
New Jersey. 449 430 831 183 00 121.00 122.00 112.00 1107.00 Pennsylvania. 320 312 313 118.00 121.00 122.00 112.00 1107.00 Pennsylvania. 320 320 827 326 327 328 321 112.00 112.00 1107.00 104.00 104.00 105.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.0	Phode Telend						135.00	130.00	135 00	133.00	108.00
New Jersey. 449 430 831 183 00 121.00 122.00 112.00 1107.00 Pennsylvania. 320 312 313 118.00 121.00 122.00 112.00 1107.00 Pennsylvania. 320 320 827 326 327 328 321 112.00 112.00 1107.00 104.00 104.00 105.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.00 104.00 106.00 107.0	Connecticut	27					140 00	145 00	140.00	137 00	110.00
North Atlantic. 987 928 871 838 809 117. 34 122.61 128. 90 112. 82 105. 41 100 110. 101. 100 110. 101. 100 110. 101. 100 110. 101. 100 110. 101. 100 110. 101. 100 110. 101. 100 110. 101. 100 110. 101. 100 110. 101. 100 110. 101. 100 110. 101. 100 110. 101. 100 110. 101. 100 110. 101. 100 110. 101. 100 110. 101	New IORK						116.00	121.00	128.00	115.00	107.00
North Atlantic. 987 926 871 836 809 117.34 122.51 126.90 112.82 105.41 Ohlo. 542 620 504 494 469 101.00 105.00 107.00 93.00 87.00 Indiana. 517 494 465 438 425 82.00 82.00 82.00 76.00 73.00 Illinois. 823 886 830 830 773 774.00 77.00 77.00 78.00 Michigan 420 404 389 381 373 98.00 110.00 111.00 98.00 97.00 Wisconsin. 562 555 556 544 834 98.00 110.00 111.00 98.00 97.00 North Central, East. 2.922 2, 822 2, 720 2, 652 2, 576 88.48 92.08 20.08 20.07 10.00 97.00  North Dakota. 1,100 1,073 1,075 1,035 1,037 996 75.00 82.00 82.00 71.00 86.00 60.00 Missouri. 638 625 610 552 574 60.00 53.00 52.00 71.00 68.00 South Dakota. 661 641 624 605 581 83.00 57.00 83.00 63.00 63.00 North Dakota. 768 778 778 779 697 60.00 61.00 61.00 61.00 North Dakota. 778 778 778 778 697 607 60.00 61.00 61.00 North Dakota. 778 778 778 778 779 697 60.00 61.00 61.00 61.00 North Dakota. 778 778 778 778 779 697 60.00 61.00 61.00 North Dakota. 778 778 778 778 779 697 60.00 61.00 61.00 North Dakota. 778 778 778 778 779 697 607 60.00 61.00 61.00 North Dakota. 778 778 778 778 779 697 607 60.00 61.00 61.00 North Oentral, West. 5,475 5,325 5,200 5,047 4,894 60.66 63.74 63.45 53.77 45.55 North Central. 8,368 8,146 7,929 7,699 7,468 70.34 73.76 73.85 63.03 56.07 North Oentral. 8,368 8,146 7,929 7,699 7,468 70.34 73.76 73.85 63.03 56.07 North Oentral. 8,368 8,146 7,929 7,699 7,489 40.08 80.00 91.00 77.00 78.00 North Oentral. 8,368 8,146 7,929 7,699 7,489 70.00 83.00 83.00 83.00 83.00 87.00 North Oentral. 8,368 8,146 7,929 7,699 7,489 70.00 83.00 83.00 83.00 83.00 North Oentral. 8,368 8,146 7,929 7,699 7,489 70.00 83.00 83.00 83.00 83.00 North Oentral. 8,368 8,146 7,929 7,699 7,489 70.00 83.00 83.00 83.00 83.00 North Oentral. 8,368 8,146 7,929 7,699 7,489 70.00 83.00 83.00 83.00 83.00 North Oentral. 8,368 8,146 7,929 7,699 7,489 70.00 83.00 83.00 83.00 83.00 North Oentral. 8,368 8,146 7,929 7,699 7,699 7,699 7,609 7,600 83.00 83.00 83.00 North Oentral. 8,368 8,146 7,929 7,699 7,699 7,699 7,609 7,600 83.00 83.00 83.00 North Oentral. 8,368 8,146 7,929 7,699 7,699 7	New Jersey	47	44			35	109.00	114.00	124.00	1 112,00	102. CO
Ohlo	Pennsylvania	350	331	317	309	297	112. 00	116.00	120.00	103.00	104.00
Indiana	North Atlantic	987	926	871	836	809	117. 34	122.51	126.90	112,82	105. 41
Michigan 420 404 389 381 373 98.00 110.00 111.00 117.00 77.00 North Central, East 2,923 2,821 2,729 2,652 2,674 88.48 92.08 93.08 83.26 76.07 Minesota 11,100 1,073 1,058 1,037 996 75.00 79.00 80.00 68.00 56.00 Missouri 638 625 610 652 574 60.00 53.00 51.00 45.00 40.00 North Dakota 665 643 616 604 686 64.00 68.00 51.00 40.00 North Dakota 661 641 624 605 881 63.00 55.00 45.00 45.00 40.00 North Dakota 788 772 757 719 697 60.00 61.00 61.00 61.00 61.00 61.00 61.00 61.00 61.00 62.00 44.00 41.0	Ohio			504	484	469	101.00	105.00	107.00	93. 00	
Michigan 420 404 389 381 373 98.00 110.00 111.00 117.00 77.00 North Central, East 2,923 2,821 2,729 2,652 2,674 88.48 92.08 93.08 83.26 76.07 Minesota 11,100 1,073 1,058 1,037 996 75.00 79.00 80.00 68.00 56.00 Missouri 638 625 610 652 574 60.00 53.00 51.00 45.00 40.00 North Dakota 665 643 616 604 686 64.00 68.00 51.00 40.00 North Dakota 661 641 624 605 881 63.00 55.00 45.00 45.00 40.00 North Dakota 788 772 757 719 697 60.00 61.00 61.00 61.00 61.00 61.00 61.00 61.00 61.00 62.00 44.00 41.0	Indiana	517					82.00	82.00	82.00	76.00	
North Central, East	Michigan		856 404	830	805	773	74.00	110 00	111 00	RA' 00	07.00
North Central, East	Wisconsin			550	544	573 534	98.00	102.00	102.00	91.00	77.00
Minnesota         819         813         807         791         775         79,00         82,00         82,00         71,00         56,00           Missouri         638         625         610         592         75,00         78,00         80,00         88,00         85,00         80,00											
Misson   M	·										
Misson   M	Minnesota	819	813	807	791			82.00	82.00	71.00	56.00
North Dakota	Missonri	1,100	1,073	1,058	1,037	574	50.00	79.00	51.00	45 00	40.00
North Central, West	North Dakota	665	643				54.00	53.00	52 00	44.00	
North Central, West	South Dakota	661	641	624	605	581	53.00	57,00	53.00	45.00	36.00
North Central, West.	N CDTaska	788	772	757	719	697	60.00	61.00	61.00	1 52,00	44.00
North Central   8,398   8,146   7,929   7,699   7,468   70.34   73.76   73.85   63.93   56.07	Kansas	798	758	728	699	685	43.00	49.00	48.00	38.00	37.00
Delaware	North Central, West	5,475	5, 325	5, 200	5,047	4,894	60.66	63. 74	63.45	53.77	45. 55
Maryland         100         97         95         93         91         89.00         92.00         97.00         83.00         68.00         68.00         West Virginia         221         212         212         215         115         116         98.00         83.00         83.00         88.00         86.00         87.00         87.00         87.00         87.00         87.00         87.00	North Central	8,398	8, 146	7,929	7, 699	7, 468	70. 34	73. 76	73.85	63. 93	56.07
Maryland         100         97         95         93         91         89.00         92.00         97.00         83.00         68.00         68.00         West Virginia         221         212         212         215         115         116         98.00         83.00         83.00         88.00         86.00         87.00         87.00         87.00         87.00         87.00         87.00	Delaware		19	18	17	17	79.00	90.00	93.00	82, 00	64.00
West Virginia         127         122         116         112         106         84. 00         89. 00         91. 00         79. 00         70. 00           North Carolina         106         98         89         83         77         87. 00         85. 00         85. 00         76. 00         65. 00           South Carolina         42         36         31         28         26         81. 00         82. 00         83. 00         60. 05         54. 00           Florida         25         23         21         20         19         83. 00         87. 00         77. 00         63. 00         52. 00           Florida         25         23         21         20         19         83. 00         87. 00         77. 00         63. 00         52. 00         77. 00         67. 00         77. 00         67. 00         77. 00         67. 00         67. 00         87. 00         87. 00         77. 00         67. 00         68. 00         87. 00         87. 00         77. 00         67. 00         68. 00         60. 00         60. 00         60. 00         60. 00         60. 00         60. 00         60. 00         60. 00         60. 00         60. 00         60. 00         60. 00	Maryland	100	97	95			89.00	92.00	97.00	83.00	68.00
South Atlantic   682   640   613   584   558   79.03   84.29   87.07   74.23   65.67	Virginia	127	212		195	187	70.00	78.00	83.00	70.00	70.00
South Atlantic   682   640   613   584   558   79.03   84.29   87.07   74.23   65.67	North Carolina	106	98	89	83	77	87.00	86.00	85.00	76.00	65.00
South Atlantic   682   640   613   584   558   79.03   84.29   87.07   74.23   65.67	South Carolina	42	36	31	28	26	81.00	82.00	83.00	0 69.00	54.00
South Atlantic   Case	Georgia	21		88			78.00	78.00	77.00	63.00	52.00
Rentucky   280   288   248   221   222   53.00   56.00   60.00   51.00   47.00	Florida	25	23	21	20	19	83.00	87.00	87.00	77.00	67.00
Texas         8/0         820         780         741         704         45.00         47.00         46.00         35.00         30.00           South Central         2, 357         2, 240         2, 140         2, 028         1, 924         47.29         48.34         48.01         39.41         38.17           Montana         525         408         462         430         400         31.00         31.00         30.00         27.00         23.01           Idaho         216         211         206         198         190         51.00         54.00         51.00         44.00         36.			646	613	584	558	79.03	84, 29	87.07	74, 23	65. 67
Texas         8/0         820         780         741         704         45.00         47.00         46.00         35.00         30.00           South Central         2, 357         2, 240         2, 140         2, 028         1, 924         47.29         48.34         48.01         39.41         38.17           Montana         525         408         462         430         400         31.00         31.00         30.00         27.00         23.01           Idaho         216         211         206         198         190         51.00         54.00         51.00         44.00         36.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.	Kentucky	280	258		231			56.00	60.00	51.00	47.00
Texas         8/0         820         780         741         704         45.00         47.00         46.00         35.00         30.00           South Central         2, 357         2, 240         2, 140         2, 028         1, 924         47.29         48.34         48.01         39.41         38.17           Montana         525         408         462         430         400         31.00         31.00         30.00         27.00         23.01           Idaho         216         211         206         198         190         51.00         54.00         51.00         44.00         36.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.	Tennessee.	201						60.00	65.00	56.00	49.00
Texas         8/0         820         780         741         704         45.00         47.00         46.00         35.00         30.00           South Central         2, 357         2, 240         2, 140         2, 028         1, 924         47.29         48.34         48.01         39.41         38.17           Montana         525         408         462         430         400         31.00         31.00         30.00         27.00         23.01           Idaho         216         211         206         198         190         51.00         54.00         51.00         44.00         36.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.	Alabama	76				55			65.00	51.00	48 00
Texas         8/0         820         780         741         704         45.00         47.00         46.00         35.00         30.00           South Central         2, 357         2, 240         2, 140         2, 028         1, 924         47.29         48.34         48.01         39.41         38.17           Montana         525         408         462         430         400         31.00         31.00         30.00         27.00         23.01           Idaho         216         211         206         198         190         51.00         54.00         51.00         44.00         36.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.	Arkonges	156	149		133	132	43.00	41.00	43.00	N 39 (V	บรากก
Texas         8/0         820         780         741         704         45.00         47.00         46.00         35.00         30.00           South Central         2, 357         2, 240         2, 140         2, 028         1, 924         47.29         48.34         48.01         39.41         38.17           Montana         525         408         462         430         400         31.00         31.00         30.00         27.00         23.01           Idaho         216         211         206         198         190         51.00         54.00         51.00         44.00         36.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.00         38.	Louisiana	121	119	118	112	106	52.00	53.00	52.00	46.00	38.00
South Central         2,357         2,240         2,140         2,028         1,924         47.29         48.34         48.01         39.41         85.17           Montana         525         498         462         430         400         31.00         30.00         27.00         23.00           Idaho         216         211         206         198         190         51.00         51.00         51.00         40.00         31.00         30.00         27.00         23.00           Wyoming         186         181         170         171         106         31.00         32.00         34.00         34.00         26.00         26.00         26.00         26.00         28.01         33.33         331         324         43.00         47.00         44.00         34.00         34.00         26.00         26.00         28.00			527	507	482	453	38.00	39.00	39.00	33.00	80.00
Montana         525         4UR         462         430         400         31.00         31.00         30.00         27.00         23.00           Idaho         216         211         206         198         190         51.00         54.00         51.00         44.00         36.00           Wyoming         186         181         170         171         108         31.00         32.00         34.00         34.00         26.00           Colorado         343         343         333         331         324         43.00         47.00         44.00         41.00         34.00         26.00         New Mexico         161         151         142         135         128         31.00         35.00         33.00         28.00         23.00         Ar.00         31.00         36.00         32.00         28.00         23.00         Ar.00         36.00         32.00         38.00         28.00         23.00         47.00         45.00         35.00         33.00         28.00         23.00         47.00         51.00         51.00         51.00         36.00         27.00         27.00         27.00         27.00         27.00         28.00         27.00         28.00         28.	Texas	8/10	820	780	741	704	45.00	47.00	46.00	35.00	30.00
102   97   92   90   87   61   00   63   00   62   00   54   00   18   00   00   00   00   00   00			2, 240	2, 146	2,028	1,924	47. 29	48. 34	48.61	39.4	85. 17
102   97   92   90   87   61   00   63   00   62   00   54   00   18   00   00   00   00   00   00	Montana	525	408		430	400		31.00	30.00	27.00	23.00
102   97   92   90   87   61   00   63   00   54   00   31   00   00	1Gano	216	211				1 51.00	39.00	01.00	1 41.00	00.08 n
102   97   92   90   87   61   00   63   00   62   00   54   00   18   00   00   00   00   00   00	Colorado	343	343	338	331	324	43.00	47.00	44.00	41.0	31.00
102   97   92   90   87   61   00   63   00   62   00   54   00   18   00   00   00   00   00   00	New Mexico	161	151	142	135	12	31.00	35.00	33.00	0 28.00	1 23.00
Western 2,344 2,230 2,125 2,018 1,020 47.89 49.86 48.07 42.50 35.6	Arizona	102	1 90	80	77	74	49.00	51.00	51.00	DI 43.00	41.00
Western 2,344 2,230 2,125 2,018 1,020 47.89 49.86 48.07 42.50 35.6	Utah	102	97	92	90	87	61.00	63.00	62.00	54.0	38.00
Western 2,344 2,230 2,125 2,018 1,020 47.89 49.86 48.07 42.50 35.6	Washington	200				18	00.00 1 85.00	68.00	04.00	55.0	1 49.00
Western 2,344 2,239 2,125 2,018 1,920 47.89 49.86 48.07 42.50 35.6	Oregon	194	186	178	169	163	65.00	65.00	61.00	53.0	44.00
Western 2,344 2,239 2,125 2,018 1,920 47.89 49.86 48.07 42.50 35.6	California	263	24	227	207	190	74.00	78.00	78.00	69.0	59.00
United States 14, 768 14, 203 13, 684 13, 165 12, 679 66, 68 69, 63 69, 86 60, 43 53, 3			2, 239	2, 125	2,018	1,02	47.8	49.8	48.0	7 42.5	35. 62
	United States	14,768	14, 203	13, 684	13, 16	12, 67	66.6	69. 6	69. 8	60.4	53. 37

Bureau of Agriculture Economics. Estimates of the crop-reporting board.

<sup>&</sup>lt;sup>1</sup> Sum of total value of subgroups (classified by ago), divided by total number and rounded to nearest dollar for States. Division and United States averages not rounded.

<sup>2</sup> Revised, January, 1932. For revisions of numbers, by States, for years earlier than 1928, see February, 1932, issue of Crops and Markets.

<sup>3</sup> Preliminary.

Table 382.—Horses: Number in countries having 80,000 and over, average 1921-1925, annual 1926-1931

	1020, 0							
Country	Month of estimate	Aver- age 1921- 1925 <sup>1</sup>	1926	1927	1928	1929	1930	1931
North America, Central America, and West Indies: United States— On farms. Not on farms.	Jan. 1	Thou- sands 18, 051 2 1, 706 3, 627 8 930	Thou- sands 18, 067	Thou- sands 15, 368	Thou- sands 14, 768	Thou- sands 14, 203	Thou- sands 13, 684	Thou- sands 13, 165
Canada	June	3, 627	8, 398	3, 422	3, 376	3, 376	3, 295	
Mexico		i 980 70	1, 036 94	75	53	59	63	
Guatemala Costa Rica	July	105	127	126	102	85		
Crrhe	December 4	844	685	747	716	634	758	634
Dominican Republic	April	136	110	115	125	125		
Halti								
Estimated total 5		25, 800						
South America: Columbia Venezuela		971 168	980	978		929		
Warra dan		85				85 432		
Peru Bolivia Chile	December 4	158 (150)	204	320		376		
Chile	December	482					3 441	
Brazil	September	2 5, 254 2 613					2 500	
Uruguay Paraguay	Decembers	7 490					* 000	
Argentina	December 4 June and Decem- ber 4	9, 432					2 9, 858	
	Der -	12 000						
Estimated total 5		17, 800		===	===			====
Europe: England and Wales	June	1, 280	1, 129	1,077	1, 038	999	961	038
Scotland	do	202	179	172	166	161	157	938 153
Scotland North Ireland  Irish Free State  Norway  Norway	do	98	91	89	87	86	87	86
Irish Free State	do	332 188		319 183	321 182	319 177	325 177	326 177
	do	10 864		620			653	
Denmark Netherlands Belgium France	July	564	548	525	519	521	594	498
Netherlands	May-June	1 364 230		250	256	253	<sup>3</sup> 209 249	
France	do.4	2,76	2, 880	2,894		2, 936 598	2,986	2, 924
	do.4	634	698	719		s 598		
Portugal Italy Switzerland	October-March	1,008		1,050			3 967	
Switzerland	March April	134	140	1,000			140	
Germany	April December 4	3, 690	3, 917		8, 810	3, 718	3, 617	
Austria Czechoslovakia	do.4	268 591					248 2747	
Hungary	Spring or summer	814	88	903	918	892	860	865
Yugoslavia Greece Bulgaria	January December 4do.4	1,00	1, 117	1, 120	1, 109	1, 140		1. 161
Greece	December 4	208	270	281	277	290	323	
Rumania		1,720	1.81	1,778	~ī, 83ī	1, 850	1,867	1, 809
Poland	November	3,290	)	4,069		4,017	4, 103	4, 123
Lithuania	Spring	470 324			011 365	588 350	759 359	860
Latvia Estonia	Spring or summer.	210		230	228			
Finland	Spring or summer.	399	400	396	304	395		
Russia, European and Asiatic.	Spring	24, 611	28, 42	31, 538	33, 506	34, 606	31, 158	
Estimated total 5		22, 100						
Africa:			1	-				
Morocco.		174	190		187	197	200	
Algeria	March	16		162	164	163	173	
Tunis French West Africa and	December 4	145	190	87	92			95
KTANCO SIIGAN	1			i	1			
Nigeria, including British Cameroons.		. 17	18	182	203	197	184	
Union of South Africa	Spring or summer.	92	88			1	1	1
Basutoland	- Spring or Summer.	16	8 24		250	204	137	
Estimated total 5		2,00	0					
	1	<del></del>	<del> </del>	-	-	<b> </b>	<b> </b>	تستحدر

See footnotes at end of table.

Table 382.—Horses: Number in countries having 80,000 and over, average 1921-1925, annual 1926-1931-Continued

Country	Month of e timate	A ver- age 1921- 1925 1	1928	1927	1928	1929	1930	1931
Asia: Turkey, European and Asiatic. Persia	Summer	Thou- sands 452		Thou- sands 459	Thou- sands 485	sands	sands	sands
India— British Native States China, including Manchuria and Turkestan	December-Aprildo	1, 747 502 4, 900	445	1, 691 466	464	1, 728 491 10 4, 500	1, 701 2 557	
Japan French Indo-China Siam Philippine Islands <sup>11</sup>	December 4	107 183		1, 486 98 265 309	97 283	97 298	97	
Dutch East Indies— Java and Madura————— Outer possessions—————	do.4	273 443	267 463	259 452	258 451	248 458	252 456	
Estimated total		12, 100						
Oceania: Australia New Zealand	December 4 Jan. 31	2, 373 328	2, 250 315	2, 123 304	2, 041 307	1, 943 299	1, 846 297	
Estimated total 5	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	2,700						
Total, all countries reported, all periods, including Russia— To 1930 (35) 11———— To 1931 (15) 13 13————— Estimated world total 5—		68, 972 27, 980 107, 100	25, 956	73, 130 25, 222			70, 509 23, 612	22, 717

Bureau of Agricultural Economics. Compiled from official sources and the International Institute of Agriculture. Figures in parenthesis are interpolated.

8 1920.

6 1924.

7 1918.

Includes mules and asses.
 Comparable totals for the number of countries indicated.

13 Excluding Russia.

Average for 5-year period if available, otherwise for any year or years within this period except as otherwise stated.
 Census.

<sup>&</sup>lt;sup>4</sup> Estimates for countries reporting as of December have been considered as of Jan. 1 of the following year; i. e., horses as reported in France for Dec. 31, 1926, have been placed in the 1927 column.
<sup>5</sup> Includes interpolations for a few countries not reporting each year and rough estimates for some others.

<sup>Incomplete. Refers to horses used in agriculture only for Northern Ireland and Irish Free State.
Rural communities only.
Unofficial.</sup> 

Table 383.—Mules and mule colts: Estimated number on farms and value per head, by States, January 1, 1928-1932

	Number					Value per head <sup>1</sup>				
State and division	1928 2	1929 2	1930 3	1981 2	1932 ³	1928	1929	1930	1931	1932
Maine	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Dol- lars	Dol- lars	Dol- lars	Pol- lars	Dol- lars
New Hampshire										
Vermont										
Massachusetts										
Connecticut										
New York	7	6	6	6	6	125, 00	120.00	127.00 130.00	127. 00 130. 00	102.00
New Jersey	4	4	4	3	_3	118, 00	123.00	130.00	130.00	119.00
Rnode Island Connecticut New York New Jersey Pennsylvania	51	51	51	50	50	121.00	127, 00	129.00	117.00	111.00
North Atlantic	62	61	61	59	59	121. 26	126. 05	128.98	118.80	110.61
Ohio	33	32	32	32	32	102,00	101.00	107.00	94.00	89.00
Indiana Illinois	97	90	86	86	83	86.00	88.00	89.00	83.00	77.00
Illinois	150	142	136	132 6	129	82, 00 93, 00	86. 00 102. 00	88. 00 110. 00	79. 00 93. 00	69.00
Michigan Wisconsin	4	6	7	7	6	95.00	95.00	92.00	79.00	89. 00 74. 00
North Central, East	294	277	267	263	257	86. 14	88, 96	91. 43	82. 31	74.78
Minnesota	15	15	15	15	15 81	83.00	83. 00 86, 00	85. 00 90. 00	74.00	63, 00
Iowa	95 330	90 313	85 300	83 297	291	84. 00 68. 00	75.00	76.00	76.00 64.00	64. 00 55. 00
North Dakota	9	8	8	8	- 8	57.00	55.00	59.00	49.00	45.00
Missouri North Dakota South Dakota	19	19	19	18	18	63, 00	55. 00 63. 00	64.00	56,00	46, 00
Nebraska Kansas	112 203	106 185	99 160	95 155	91 143	75. 00 60. 00	76. 00 65. 00	79.00 66.00	62.00 58.00	57.00 52.00
North Central, West	783	736	686	671	647	68, 91	73. 61	75.68	63. 54	
· · · · · · · · · · · · · · · · · · ·					-					55. 47
North Central	1, 077	1, 013	953	934	904	73. 61	77. 81	80. 09	68. 83	60. 96
Delaware	10	10	10	10	10	95.00	96.00	104.00	100.00	93.00
Maryland	29 98	29 97	29 96	29 94	29 93	113.00 92.00	97.00	118.00 101.00	105.00 85.00	95.00
West Virginia	14	14	13	13	12	81.00	86.00	95. 00	83.00	84. 00 74. 00
North Carolina	284	282	282	276	273 176	119.00 105.00	124.00	120.00	114,00	89.00
Virginia West Virginia North Carolina South Carolina Georgia	187	183	180	176	176	105.00	105.00	109.00	92.00	74.00
Florida.	847 43	314 42	344 42	340 42	333 42	105.00 119.00	109.00 124.00	105.00 125.00	87.00 106.00	70.00 97.00
South Atlantic			996	980	908				96, 69	
ļ•	1, 012	1, 001						110. 58	<del></del>	79. 62
Kentucky Tennessee	284 342	270 335	257 328	246 321	241 318	67. 00 75. 00	69. 00 80. 00	77. 00 89. 00	61.00 73.00	59. 00
Alabama	313	319	322	822	319	95.00	95.00	93.00	74.00	67. 00 62. 00
Mississippi	345	351	358	358	347	87,00	85.00	88, 00	66,00	63.00
Alabama Mississippi Arkansas Louisiana Oklahoma	338	348	353	312	332	64.00	65.00	67.00	48.00	46.00
Oklehome	187 340	191 830	197 318	197 302	189 287	85. 00 52, 00	89. 00 58. 00	85. 00 59. 00	74.00 47.00	63. 00
Teras	1, 160	1, 100	1, 053	990	960	71.00	71.00	71.00	54.00	43, 00 47, 00
South Central	3, 309	3, 244	3, 186	3, 078	2, 993	73. 13	74. 73	76. 50	60. 20	54. 05
Montana	10	9	9	9	8	47. 00	47.00	44. 00	44.00	29. 00
Montana Idaho Wyoming Colorado New Mexico Arizona Utah Nevada Washington	7	7	7	7	7	55.00	0 60.00	63, 00	51.00	45. 00
Wyoming	4	4	4	4	4	55.00	55.00	59.00	48.00	45.00
New Mexico	82 27	31 25	30	28 23	27 22	56. 00 45. 00	58.00 50.00		52.00	42, 00
Arizona	27 18	12	24 12	12	12	77.00	82.00		39. 00 66. 00	39. 00 58. 00
Utah	3	8	3	3	3	61.00	67.00	65.00	54, 00	35.00
Nevada	3	3		3	3	61.00	62.00	55.00	47.00	44.00
Washington Oregon		23 15	3 3 22 14	21 14	20	73.00 72.00	74.00 71.00	68. 00 64. 00	55. 00 51. 00	54. 00 49. 00
California	48	45	42	40	14 38	85.00	88.00	90.00	78.00	67.00
Camorma										
Western	187	177	170	164	158	66. 49	68, 98	67, 11	57. 21	50. 39

Bureau of Agricultural Economics, Estimates of crop-reporting board. Revisions by States, 1920–1927, are published in February, 1932, Crops and Markets.

<sup>&</sup>lt;sup>1</sup> Sum of total value of subgroups (classified by age), divided by total number and rounded to nearest dollar for States, Division and the United States averages not rounded,
<sup>2</sup> Revised, January, 1932,
<sup>3</sup> Preliminary.

Table 384.—Mules: Number in countries having 20,000 and over, average 1921-1925, annual 1926-1931

Country	Month of estimate	Aver- age 1921- 1925 1	1926	1927	1928	1929	1930	1931
North America, Central America, and West Indies: United States— On farms Not on farms		Thou- sands 5,804	Thou- sands 5, 903	Thou- sands 5, 801	Thou- sands 5, 647	Thou- sands 5,496	Thou- sands 5, 368	Thou- sands 5, 215
Mexico		330	686					
Cuba Dominican Republic	April	74 44	72	72	73	68	92	90
Porto Rico		20	23	23	23	25		
Estimated total 5		6, 800						
South America:								
Colombia Venezuela		351 55	360	316		329		
Peru Bolivia		(130)				<sup>2</sup> 130		
Bolivia	December 4	(150) 42	155	175			2 31	
ChileArgentina	December 4	023						
Estimated total 5		1, 300						
Europe: Total Ireland Irish Free State		25	21	19	19	17 17	17 16	17 16
FranceSpainPortugal	December	188 1, 129 88	188 1, 286	185 1, 295	183	166 2 1,154	143	154
Italy Germany	March	500 (0)	520			(6)	2 457	
YugoslaviaGreece Bulgaria	January December 4	28 128	(8) 15 138	15 148	15 135	(b) 15 150	15 148	16
Estimated total	1	2, 200						
Africa:		-				92	100	
Morocco Algeria Tunis Egypt Union of South Africa	December 4	31 21	78 165 33 23 138	84 164 37 21	86 164 88 23	165 40 22	169 41 21	44
Estimated total		500						
Asia and Oceania: Turkey, European and Asiatic Syria and Lebanon India, British	T)acember-April	91 20 75	23 25 69	30 20 70	37 20 71	22 71	23 2 75	
China Kwantung	l	7 5,100 16	17	19	20	22	22	23
Estimated total 4		5, 400						
Total all countries re- reported all periods to 1930 (14) 8.	(1)	6, 747	6, 747	6, 655	6, 494	6, 246	6, 232	
		16, 200	1	1	l l	1	I .	1

Bureau of Agricultural Economics. Compiled from official sources and the International Institute of Agriculture. Figures in parentheses are interpolated.

<sup>1</sup> Average for 5-year period if available. Otherwise for any year or years within this period except as otherwise stated.

<sup>&</sup>lt;sup>2</sup> Census.

<sup>81020.</sup> 

<sup>\*1920.

\*</sup>Estimates for countries reporting as of December have been considered as of Jan. 1 of the following year; 1. e., mules reporting as of Dec. 31, 1926, in France have been placed in 1927 column.

\*Includes interpolations for a few countries not reporting each year and rough estimates for some others. It is probable that nules are found in many other countries for which no estimates at all are available and for which no estimates are included in these totals.

\*Included with asses.

\*Testimate based on figures for 20 Provinces which supported 84 per cent of total in China in 1914.

\*Comparable totals for the number of countries indicated.

Table 385.—Asses: Number in countries having 20,000 and over, average 1921-1925, annual 1926-1931

Country	Month of estimate	Aver- age, 1921- 1925 1	1926	1927	1928	1929	1930	1931
North America, Central Amer- ica, and West Indies: United States, on farms		Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands
Marico	1	8 521	850					
Guatemala 4  Dominican Republic  Haiti		(30) 122			27	84	37	
Dominican Republic	April	122		210				
			170	210	240	240		
Estimated total 3		1,000						
South America:		140	140	157		7.40		
ColombiaVenezuela		149	140	107		149		
Port		200 (265)				2 265		
Peru Bolivia	December 6	J (185)	189	190		200		
ChileBrazīlParaguayArgentina		30					3 37	
Brazil	September	241,865						
Paraguay	December 6	20						
	ao.º	289						
Estimated total 4		4,400						
Europe:								
Irish Free State		210	199	197	196	185	183	177
Ireland, total	June	224	208	206	204	194	191	191
France	December 6	290	273	264	260	250	234	191
Spain	December-May 6_	1,067	1,077	1, 138		2 1,006		
Portugal	October	236						
Italy		969	980				2 852	
Germany	December	4 32	4 30			4 24	4 21	4 19
Y ugoslavia	January	90 250	96 299	98 319	104 328	106	555-	107
Italy	December	122	299	919	828	343	381	
Estimated total 5	40,*							
		3, 500						
Africa:								
Morocco.		490	565	508	497	541	576	
Algeria	March	207	285	275	279	296	301	
Libia (Italian) Tunis	December 6	138	119	154	162	159	161	180
		334	407	430	462	602	577	190
72		1	20.	200	100	002	0,,	
Nigeria and British Cameroon.		499	496	500	538	548	278	
Egypt	September	653	739	750	762	759	763	
Kenya colony		34	36	36	36	87		
Anglo-Egyptian Sudan		296	345	848	849	350	351	
French Sudan Nigeria and British Cameroon Egypt Kenya colony Anglo-Egyptian Sudan Eritrea (Italian) French Equatorial Africa		47	57					
British Southwest A frice		36	45	52	58	61	61	
British Southwest Africa Union of South Africa Rhodesia, South 4 Tanganyika Territory	April-August	780	796	02	00	O,	OT	
Rhodesia, South	December 6	25	33	38	42	45	50	
Tanganyika Territory		24	36	40	43	50	51	
Estimated total 5		3, 700						
		0,100						
Asia: Cyprus		45	43	42	20			
Turkey, European and Asiatic.		556	640	930	52	54	54 861	
Syris and Lebanon		91	949 100	125	928 123	849 126	115	
India, British	December A ord	1,382	1,408	1, 409	1, 443		1,380	
India, British Native States	do	348	307	306	308	308	3,441	
Kwantung	December 6	29	28	27	27	28	29	27
Estimated total		2, 500						
m.4.1 -11 -11								
Total, all countries re- ported, all periods to 1930 (20).		6, 127	6, 884	6, 920	7, 061	7, 188	7, 088	
Estimated world total 5		13, 800						
		-3,000						
Propert of Amignitude Venner	nion Commiled to	00-4				·	<u></u>	

Bureau of Agricultural Economics. Compiled from official sources and the International Institute of Agriculture. Figures in parentheses are interpolated.

Average for 5-year period if available. Otherwise, for any year or years within this period except as otherwise stated.
 Consus.
 Incomplete.
 Asses and mules.

<sup>7</sup> Comparable totals for number of countries indicated.

## DAIRY AND POULTRY STATISTICS

TABLE 386.—Milk cows: Numbers and value per head in the United States, 1850, 1860, 1867-1931

	Milk cow	s on farms		Milk cows on farms		
Year	Num- ber 1 Value per head Jan. 1 2		Year	Num- ber <sup>1</sup>	Value per head Jan. 1	
1850 s	9, 248 8, 956 10, 956 10, 956 10, 576 10, 705 11, 285 11, 320 11, 320 12, 242 12, 329 12, 321 14, 325 14, 325 14, 325 14, 325 14, 325 16, 416 16, 526 16, 424 16, 605	Dollars  28. 74 26. 56 29. 15  32. 70 33. 89 29. 472 25. 61 25. 74 21. 71  23. 27 23. 95 30. 21, 71 24. 65 23. 24 21. 62 21. 40 21. 77 21. 57 22. 162 21. 77 22. 55 23. 16 27. 48	1900 \$ 1900.	17, 937 18, 184 80, 625 18, 206 18, 246 18, 516 18, 526 18, 526 18, 526 20, 064 21, 101 21, 1021 21, 124 21, 455 21, 445 21, 455 22, 209 22, 209 22, 200 22, 201 22, 112 22, 112 22, 112 22, 112 22, 112 22, 112 22, 112 22, 112	Dollars  30, 18 22, 55 27, 91 28, 12 29, 60 29, 29, 29 30, 90 33, 17 34, 65 51, 14 51, 51 54, 67 57, 46 48, 66 48, 94 48, 38 54, 77 59, 27 57, 24 58, 96 57, 11	

Bureau of Agricultural Economics. Estimates of the crop reporting heard.

<sup>1</sup> Prior to 1900, estimates for each 10-year period represent an index of annual changes applied to the census as a base on first report after census data were available. Figures for 1900 to 1919 are tentatively revised estimates of the Bureau of Agricultural Economics for numbers on Jan. 1. Figures from 1920 to 1931 are revised estimates made in 1932, based upon study of 1930 census report. Figures 1900 to 1932 relate to "cows and heifers 2 years old and over Jan. 1, kept for milk."

1 Values for 1867-1899 relate to "milk cows." Data for 1900-1925 are an old series of values of "milk cows" adjusted to relate to "milk cows and heifers, 2 years old and over." on basis of relationship between the 2 series from 1925 to 1928. Conversion factor was 0.955 (base is old series). Data for 1926-1932 are values relating to "milk cows and heifers 2 years old and over."

1 Italia figures are from the census. Figures for consus years 1850-1890 represent "milk cows"; 1900, "cows kept for milk 2 years and over."; 1910 "cows and heifers kept for milk, born before Jan. 1, 1909" (18)4 months and over); 1920 "dairy cattle 2 years old and over kept mainly for milk production"; 1925 and 1930, "number of cows milked in 1924 and 1929." Census dates were June 1 from 1850 to 1900; Apr. 15, 1910; Jan. 1, 1920 and 1925; Apr. 1, 1930.

4 Preliminary.

Table 387.—Milk cows and heifers: Estimated number on farms and value per head, by States, January 1, 1928-1932

		Cows	and hei	ers, 2 y	ears old	and o	ver, ke	pt for	milk	
State and division		]	Numbe	•	_		Valu	10 per	head	
	1928	1929	1980	1931	1932 1	1928	1929	1930	1931	19321
Maine	Thou- sands 138 75 279 136 20 101 1, 306 117 820	Thou- sands 135 74 276 132 20 101 1, 306 117 810	Thou- sands 136 75 277 132 21 103 1,330 118 835	Thou- sands 140 79 288 131 21 108 1,370 119 860	299 131 21 113	97. 00 125. 00 132. 00 130. 00 111. 00 120. 00	113. 00 100. 00 130. 00 142. 00 140. 00 124. 00 135. 00	Dol- lars 96.00 118.00 101.00 140.00 150.00 141.00 155.00 112.00	90. 00 79. 00 122. 00 123. 00 110. 00 86. 00 125. 00	52.00 88.00 90.00 83.00 61.00 89.00
North Atlantic	2, 992	2, 971	3, 027	3, 116				118.09		62, 51
Ohio. Indiana Illinois Michigan Wisconsin	875 686 987 775 1, 940	867 693 977 785 1, 925	900 702 1, 026 800 2, 015	910 722 1, 057 825 2, 096	938 751 1, 099 850 2, 150	83. 00 75. 00 76. 00 87. 00 86. 00	85. 00 89. 00 90. 00	89.00 99.00	59. 00 53. 00 64. 00 62. 00 64. 00	42.00 45.00
North Central, East	5, 263	5, 247	5, 443	5, 610	5, 788	82. 34	93, 56	93. 45	61. 48	42.75
Minnesota Iowa Missouri North Dakota South Dakota Nebraska Kausas	1, 525 1, 368 826 504 557 676 760	1, 539 1, 384 877 516 560 676 760	1, 595 1, 400 930 540 577 680 780	1, 643 1, 414 989 567 589 680 811	1, 708 1, 456 1, 030 589 607 700 860	72. 00 76. 00 61. 00 61. 00 68. 00 71. 00 62. 00	86. 00 74. 00 75. 00 77. 00 84. 00	70.00 73.00 78.00 79.00	44, 00 50, 00 52, 00 56, 00	30. 00 33. 00 31. 00 36. 00
North Central, West	6, 216	6, 312	6, 502	6, 693	6, 950	68. 84	80. 85	78. 55	53. 03	84. 22
North Central	11, 479	11, 559	11, 945	12, 303	12, 738	75. 03	86. 62	85. 34	56. 88	88. 10
Delaware	34 177 360 202 294 149 322 85	33 178 367 204 285 145 315 85	33 180 375 210 285 140 320 86	33 184 383 214 299 140 329 86	35 186 390 225 306 141 336 88	85. 00 58. 00 65. 00 50. 00 47. 00 42. 00	75.00 64.00 55.00 49.00	100.00 72.00 76.00 64.00 54.00 49.00	47.00 48.00 46.00 36.00	37. 00 37. 00 33. 00 25. 00
South Atlantic	1, 623	1, 612	1, 629	1, 668	1, 707	57. 43	<b>6</b> 6 65	68. 06	47. 75	35. 56
Kentucky Tennessee Alabama Mississippi Arkansas Louisianu Oklahoma Texas	496 450 318 405 364 231 023 1, 105	512 461 853 415 370 238 631 1, 160	498 468 360 430 372 240 650 1, 202	498 487 371 447 383 247 682 1, 238	518 507 390 469 421 260 716 1,288	60. 00 53. 00 40. 00 40. 00 42. 00 36. 00 56. 00 57. 00	60, 00 46, 00 45, 00	60.00 48.00 47.00 48.00	40.00 89.00 33.00 30.00 27.00 36.00 36.00	30. 00 28. 00 23. 00 21. 00 23. 00 30. 00 27. 00 29. 00
South Central	4, 022	4, 140	4, 220	4, 353	4, 569	51. 02	57. 11	55. 03	35. 13	26. 86
Montana Idaho Wyoming Colorado New Mexico Arizona Utah Nevada Washington Oregon California	183 170 70 257 67 35 100 20 270 216 625	190 173 71 258 68 37 104 20 270 220 637	193 178 72 259 69 38 108 21 280 229 642	193 187 72 280 69 40 111 21 288 240 637	195 194 72 266 70 42 113 21 300 250 637	63. 00 75. 00 70. 00 69. 00 57. 00 85. 00 73. 00 80. 00 80. 00	77. 00 67. 00 95. 00 87. 00 98. 00	80.00 84.00 72.00	55. 00 65. 00 65. 00 56. 00 50. 00 78. 00 62. 00 70. 00 68. 00 61. 00 79. 00	36. 00 39 00 39 00 36. 00 57. 00 57. 00 51. 00 58. 00 45. 00 51. 00
Western	2, 013	2, 048	2, 089	2, 118	2, 160	74. 45	88. 33	84, 76	66. 80	44, 78
United States	22, 129	22, 330	22, 910	23, 558	24, 379	73. 47	83. 99	82.80	<i>57.</i> 11	39. 61

Bureau of Agricultural Economics. Estimates of crop reporting board. Revisions by States, 1920–1927, are published in February, 1932, Crops and Markets.

<sup>&</sup>lt;sup>1</sup> Preliminary

Table 388.—Heifers and heifer calves: Estimated number on farms, by States, January 1, 1928-1932

			9 - 7							
State and division	Heifer	s 1 to 2 for	years o		g kept	Heifer	calves kept	under for milk	1 year cows	being
	1928	1929	1930	1931	1932 1	1928	1929	1980	1931	1932 1
Maine New Hampshire Vermont Massachusetts Rhode Island Connecticut New York New Jersey Pennsylvania	Thou- sands 33 15 49 17 3 13 197 15 131	Thou- sands 33 16 55 18 3 19 224 15 147	Thou-sands 36 17 58 21 3 18 245 16 174	Thou- sands 40 18 59 20 3 19 237 17 165	Thou- sands 38 18 58 18 3 17 213 16 155	Thou- sands 34 17 56 18 3 16 232 15 152	Thou- sands 37 18 59 21 4 18 250 17 180	Thou- sands 40 18 00 20 4 19 242 18 187	Thou- sands 41 19 59 20 4 19 218 16	Thou - sands 41 20 57 20 4 18 215 19 158
North Atlantic	475	527	588	578	536	543	604	608	556	552
Ohio Indiana. Illinois. Michigan Wisconsin.	145 120 183 113 361	170 135 195 151 368	187 141 218 106 385	189 149 234 169 402	182 140 215 160 399	175 139 200 156 380	193 145 225 171 397	194 154 240 175 415	188 145 215 165 412	180 144 225 163 400
North Central, East	955	1, 019	1, 097	1, 143	1, 096	1, 050	1, 131	1, 178	1, 125	1, 121
Minnesota	283 290 160 89 120 138 130	313 300 176 100 127 138 137	339 310 200 123 135 138 155	341 300 209 120 138 131 143	335 285 198 115 138 126 130	345 309 182 103 131 142 141	375 319 206 127 139 142 160	355 810 216 125 150 140 165	340 205 205 122 154 130 155	355 285 200 120 154 127 165
North Central, West	1, 216	1, 291	1,400	1, 382	1, 347	1, 353	1, 468	1, 461	1, 401	1,403
North Central	2, 171	2, 310	2, 497	2, 525	2, 443	2, 403	2, 599	2, 639	2, 526	2, 527
Delaware Maryland Virginia West Virginia North Carolina South Carolina Georgia Florida	5 27 44 26 50 29 71 16	5 29 49 29 57 27 69 15	6 30 51 32 58 28 73 14	6 32 56 31 64 30 80 14	5 28 54 29 66 29 83 15	5 29 58 30 59 28 71 16	6 30 62 34 62 29 75 15	6 31 66 34 68 30 84 14	5 28 56 34 70 29 82 15	4 20 53 34 70 30 84 16
South Atlantic	268	280	292	313	309	296	313	333	319	317
Kentucky Tennessee. Alabama. Mississippi Arkansas Louisiana Oklahoma. Texas	78 95 92 66 86 46 127 202	80 98 94 70 88 51 128 209	84 100 98 78 84 49 132 220	79 98 100 81 92 51 138 228	71 93 104 84 97 54 145 235	82 101 97 68 92 53 102 214	86 103 100 75 87 51 164 228	81 102 105 83 96 53 165 250	77 98 108 85 106 56 174 250	75 95 114 87 105 58 182 265
South Central	792	818	845	867	883	869	894	935	963	681
Montana. Idaho. Wyoming. Colorado. New Mexico. Arizona. Utah. Nevada. Washington.	35 38 15 56 13 9 24 8 57 47	37 39 15 57 14 9 26 7 61 49	37 43 15 57 15 9 25 6 62 52	39 50 15 57 15 10 28 6 65 55	39 53 15 59 15 11 29 6 65 57	39 40 16 65 16 10 27 8 64 50	40 41 16 66 16 10 26 7 85 54 160	40 50 16 66 17 10 26 7 65 53 140	41 53 16 68 17 11 29 7 70 58	41 51 17 70 17 12 30 7 70 58
Oregon California	150	155	157	154	145	160	100	140	145	100
OregonCaliforniaWestern	150 452	155 469	157 478	154 494	145 494	495	501	490	145 518	514

Bureau of Agricultural Economics. Estimates of crop-reporting board. Revisions by States ,1920–1927, are published in February, 1932, Crops and Markets

<sup>&</sup>lt;sup>1</sup> Preliminary.

Table 389 .- Heifers and heifer calves: Estimated number on farms, United States, January 1, 1920-1932

Year	Heifers 1 to 2 years old being kept for milk cows	Heifer calves un- der 1 year being kept for milk cows	Year	Heifers 1 to 2 years old being kept for milk cows	Heifer calves un- der 1 year being kept for milk cows
1920	Thousands 4, 420 4, 164 3, 972 4, 155 4, 143 4, 171 4, 045	Thousands 4,426 4,274 4,276	1927	Thousands 4, 048 4, 158 4, 404 4, 700 4, 777 4, 665	Thousands 4, 383 4, 606 4, 911 5, 005 4, 882 4, 891

Bureau of Agricultural Economics.

Table 390.—Purebred dairy cattle: Number registered, each year, by breeds, United States, 1921-1931

*****		Ayrshir	8	(	Guernsey	7	Hols	tein-Fri	esian		Jersey	
Year	Bulls	Cows	Total	Bulls	Cows	Total	Bulls	Cows	Total	Bulls	Cows	Total
1921 1922 1923 1924 1925 1926 1927 1928 1929 1930	Num- ber 1, 565 1, 578 1, 431 1, 561 1, 720 1, 847 2, 274 2, 586 2, 050 1, 552	8, 833	Num- ber 5, 874 6, 381 7, 553 6, 939 7, 533 7, 862 8, 401 10, 111 11, 419 10, 209 8, 876	Num- ber 8, 036 8, 065 9, 758 10, 301 11, 299 12, 392 12, 777 14, 363 14, 661 15, 810 12, 880	Num- ber 13, 971 14, 007 16, 976 18, 166 20, 742 22, 298 22, 694 24, 664 26, 288 28, 662 27, 964	Num- ber 22,007 22,072 26,734 28,467 32,041 34,690 35,471 39,027 40,949 44,472 40,844	Num- ber 39, 585 30, 631 29, 089 28, 209 26, 935 28, 117 28, 817 33, 512 35, 438 29, 242 21, 811	83, 320 82, 659	Num- ber 127, 850 113, 772 115, 132 111, 529 109, 594 111, 088 100, 963 121, 726 125, 365 105, 143 92, 346	Num- ber 11, 213 11, 651 12, 291 12, 331 12, 131 12, 837 15, 666 19, 393 19, 230 14, 350 10, 262	Num- ber 31, 123 33, 801 38, 159 39, 832 41, 725 42, 915 48, 411 54, 516 52, 431 43, 767 38, 211	Num- ber 42, 336 45, 452 50, 450 52, 163 53, 856 55, 752 64, 077 73, 909 71, 661 58, 117 48, 473

Bureau of Agricultural Economics. Obtained from registry associations. See 1930 Yearbook, Table 441, p. 901, for data for earlier years.

TABLE 391.—Cattle: Tuberculin testing under accredited-herd and area plans, 1920-21 to 1930-31

		Ca	tile testod			Modi- fied			Herds
Year beginning July—	Accred- ited-herd plan	Ares plan	Total	Reactors found	Per- contage of reac- tors	accred-	Herds accred- ited <sup>1</sup>	Herds passed 1 test <sup>1</sup>	under super- vision 1
1920-21 1921-22 1922-23 1923-24 1924-25 1925-26 1926-27 1927-28 1928-29 1929-30 1930-31	Number 1, 366, 358 1, 722, 209 1, 695, 663 2, 605, 526 1, 989, 048 2, 522, 791 2, 589, 844 2, 853, 633 2, 963, 350 3, 086, 403	8, 830, 087 9, 892, 521	Number 1, 306, 358 2, 384, 236 3, 460, 849 5, 312, 364 7, 000, 028 8, 650, 780 9, 700, 176 11, 281, 490 11, 683, 720 12, 845, 871 13, 782, 273	Number 53, 768 82, 569 113, 844 171, 559 214, 491 323, 084 285, 361 262, 113 206, 764 216, 932 203, 778	Per cent 3.9 3.5 3.3 3.2 3.7 2.9 2.3 1.8 1.7 1.5	Number	Number 4, 831 8, 015 12, 310 19, 747 24, 110 24, 009 34, 880 1, 639 11, 863 328, 259	Number 33, 215 111, 719 150, 748 216, 737 392, 740 382, 674 229, 086 427, 595 249, 420 227, 921 380, 735	Number 71, 806 140, 376 187, 915 305, 809 414, 620 435, 840 261, 148 473, 218 281, 323 347, 448 356, 916

Bureau of Animal Industry.

i Preliminary.

<sup>&</sup>lt;sup>1</sup>The figures in these columns represent net increases at the close of each year.

<sup>2</sup>Testing during 6 months.

<sup>3</sup>Represents net decrease during the year.

Table 392.—Milk: Annual production of milk per milk cow in herds kept by crop correspondents, by States, 1925-1931 1

State and division	1925	1926	1927	1928	1929	1930	1931
Maine	5, 274 5, 232 5, 223 6, 190 6, 248	Pounds 5, 268 5, 861 5, 180 6, 713 6, 622 6, 391 6, 159	Pounds 5, 262 5, 718 5, 350 6, 701 6, 734 6, 549 6, 296 6, 768	5, 069 5, 704 5, 200 6, 536 7, 006 6, 240 6, 823	5, 232 5, 761 5, 171 6, 251 6, 807 6, 178 6, 220	5, 351 5, 673 5, 259 6, 603 7, 166 6, 369 6, 193	Pounds 5, 055 5, 472 5, 283 6, 348 6, 975 6, 226 6, 305
New York	6, 655 5, 834	6, 460 6, 135	6, 768 6, 260	7, 085 6, 268	7, 163 6, 287	6, 962 6, 251	7, 136 6, 238
North Atlantic	5, 840	6, 061	6, 185	6, 176	6, 133	6, 138	6, 150
Ohio Indiana Illinois Michigan Wisconsin	5, 083 4, 937 6, 035	5, 670 5, 207 5, 143 6, 342 6, 108	5, 883 5, 423 5, 070 6, 363 6, 172	5, 856 5, 356 5, 252 6, 442 6, 262	5, 907 5, 542 5, 320 6, 464 6, 381	5, 767 5, 311 5, 344 6, 299 6, 196	5, 834 5, 381 5, 207 6, 342 6, 077
North Central, East	5, 578	5, 783	5, 861	5, 933	6, 025	5, 882	5, 829
Minnesota Lowa Missouri North Dakota South Dakota Notrabaka Kansas	4,438	5, 539 4, 681 3, 589 4, 474 4, 070 4, 693 4, 721	5, 673 4, 778 3, 720 4, 544 4, 468 4, 855 4, 870	5, 835 5, 124 3, 852 4, 904 4, 606 4, 907 4, 938	5, 977 5, 280 3, 854 4, 885 4, 754 4, 870 5, 034	5, 898 5, 283 3, 817 4, 897 4, 788 5, 119 5, 016	5, 770 5, 105 3, 784 4, 882 4, 730 5, 168 5, 070
North Central, West	4, 481	4, 690	4, 835	5, 030	5, 115	5, 110	5, 046
North Central	5, 010	5, 218	5, 331	5, 465	5, 554	5, 485	5, 408
Delaware. Maryland. Virginia. West Virginia. North Carolina. South Carolina. Georgia. Florida.	5, 244 4, 109 3, 863 4, 048 3, 245	5, 019 5, 505 4, 337 4, 298 4, 420 3, 501 3, 340 2, 509	5, 289 5, 797 4, 739 4, 651 4, 529 3, 705 3, 659 2, 458	5, 078 5, 792 4, 612 4, 673 4, 444 3, 773 3, 508 2, 541	5, 213 5, 591 4, 541 4, 462 4, 389 3, 595 3, 419 2, 698	4, 940 5, 302 4, 015 4, 252 4, 188 3, 035 3, 331 2, 497	5, 186 5, 420 4, 228 4, 337 4, 191 3, 702 3, 203 2, 601
South Atlantic	3, 881	4, 142	4, 415	4, 345	4, 253	4, 007	4, 063
Kentucky Tennessee Alabama Mississippi Arkansas Louisiana Oklahoma Texas	3, 446 2, 817 2, 558 3, 154 2, 324	4, 654 4, 015 3, 005 2, 835 3, 410 2, 403 4, 170 3, 303	4, 782 4, 103 3, 075 2, 987 3, 626 2, 582 4, 267 3, 626	4, 541 4, 124 2, 986 3, 026 3, 483 2, 489 4, 130 3, 553	4, 480 4, 048 3, 069 3, 011 8, 474 2, 652 4, 167 3, 604	4, 204 3, 851 3, 045 2, 996 3, 239 2, 509 3, 939 3, 440	4, 149 3, 732 2, 896 2, 935 3, 242 2, 470 3, 951 3, 443
South Central	3, 221	3, 598	3, 777	3, 689	3, 703	3, 529	3, 478
Montana Idaho Wyoming Colorado New Mexico Arizona Utah Nevada Washington Oregon California	3, 872 4, 371 3, 075 5, 143 5, 107 4, 781 6, 083 5, 356 6, 108	4, 386 5, 776 4, 380 4, 648 3, 556 5, 898 5, 451 4, 879 6, 275 5, 928 5, 636	4, 657 5, 953 4, 508 5, 101 4, 158 6, 059 5, 466 4, 924 6, 670 5, 937 6, 019	4, 737 6, 149 4, 657 5, 039 3, 822 5, 697 5, 792 4, 923 6, 512 6, 100 6, 088	5, 150 6, 300 4, 991 5, 286 3, 674 5, 819 6, 050 5, 551 6, 506 6, 369	5, 183 6, 713 4, 696 5, 223 3, 677 5, 928 5, 867 5, 521 6, 585 6, 019 6, 479	4, 687 6, 394 4, 602 4, 931 4, 027 5, 627 5, 761 5, 108 6, 400 6, 591
Western	5, 317	5, 404	5, 706	5, 748	5, 936	6, 002	5, 873
United States	4, 785	5, 015	5, 164	5, 214	5, 265	5, 188	5, 114

Bureau of Agricultural Economics.

<sup>&</sup>lt;sup>1</sup> State averages are calculated by multiplying average daily production per cow by the number of days in the year. Daily production derived from milk production and milk cows reported on the 1st of each month for about 20,000 herds. Averages for United States and divisions are weighted by States. Weights are not yet adjusted to revised estimates of numbers of milk cows.

Table 393.—Milk cows: Estimated average price 1 per head received by producers, United States, 1922-1931

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept.	Oct. 15	Nov. 15	Dec. 15	Aver- age
1922 1923 1924 1925 1926 1927 1925 1920 1930 1031	Dolls. 52.83 54.01 55.57 54.81 62.06 66.77 53.11 91.54 89.17 59.90	Dolls. 53. 54 54. 15 55. 49 54. 79 63. 41 68. 22 86. 24 91. 77 85. 02 56. 88	Dolls. 54. 87 55. 29 55. 88 56. 19 63. 17 70. 18 87. 95 92. 80 81. 00 56. 34	Dolls. 54. 46 56. 14 55. 92 56. 85 71. 98 88. 55 93. 55 80. 70 56. 53	Dolls. 54. 78 55. 91 56. 37 57. 88 60. 63 72. 43 89. 00 94. 94 70. 53 54. 45	Dolls. 54. 87 56. 34 56. 45 57. 79 66. 74 74. 10 89. 29 77. 62 51. 50	Dolls. 54. 20 56. 22 55. 46 57. 95 66. 69 74. 15 90. 37 96. 34 71. 75 49. 47	Dolls. 52. 67 65. 46 65. 37 74. 24 90. 43 95. 26 65. 91 47. 85	Dolls. 52.79 56. 13 55. 54 68 66. 12 76. 10 92. 56 95. 55 66. 23 46. 68	Dolls. 52.86 55.51 54.30 60.17 66.26 78.62 92.86 95.12 66.37 45.58	Dolls. 51. 62 55. 30 55. 05 60. 69 66. 91 81. 00 93. 05 94. 48 64. 68 45. 90	Dolls. 53. 21 54. 66 54. 00 60. 38 66. 74 82. 36 92. 87 92. 61 62. 00 44. 17	Dolls. 53,56 55,43 55,48 57,87 65,51 74,19 89,75 94,10 74,16 51,28

Bureau of Agricultural Economics. Monthly prices by States, weighted by number of milk cows Jan. 1, to obtain a price for the United States; yearly price is a simple average of 12 months. For previous data see 1930 or earlier Yearbooks.

Table 394.—Average production, cost, and value per cow of butterfat and milk, classified on butterfat basis, 12 months records completed in 1930 by dairy-herd-improvement associations

Cows	Milk	Butter- fat	Price of product per pound	Value of product	Cost of rough- age	Cost of grain	Total feed cost	Value of product over feed cost	Return for \$1 spent for feed	Feed cost per pound of but- terfat	Feed cost per 100 pounds of milk
167 2, 356 9, 838 27, 936 49, 218 56, 787 44, 075 25, 618 11, 790 4, 550 1, 723 616 224 75 34	Pounds 221 1, 331 2, 006 5, 219 6, 425 7, 601 8, 732 9, 886 13, 329 114, 684 16, 203 17, 469 18, 523 19, 752 18, 432 19, 752 18, 432 7, 643	Pounds 10 10 10 10 10 10 10 10 10 10 10 10 10	Dollars 0. 78 . 68 . 68 . 62 . 62 . 61 . 61 . 61 . 62 . 64 . 65 . 69 . 69 . 69 . 69	Dollars 8 8 37 69 97 125 155 124 224 224 227 3313 348 340 4430 485 552 449 615 583	Dollars 24 27 31 35 35 35 40 40 47 51 53 53 53 77 73 30 30 30 30 30 30 30 30 30 30 30 30 30	Dollars 12 16 20 24 28 39 44 48 56 63 71 80 94 103 121 115 115	Dollars 36 43 51 51 51 51 51 51 51 51 51 51 51 51 51	Dollars 1 -28 1-6 18 40 62 83 106 130 130 176 200 230 256 250 250 250 250 250 250 250 250 250 250	Dollars 0.22 .86 1.370 1.98 2.15 2.25 2.27 2.78 2.89 2.97 2.90 3.10 2.67 2.73 2.83	Dollars 3, 60 - 80 - 80 - 81 - 87 - 81 - 29 - 22 - 22 - 22 - 22 - 22 - 22 - 22	Dollars 16.29 3.23 1.91 1.45 1.21 1.12 1.03 90 90 89 88 89 91 84 34 91 98 551

Bureau of Dairy Industry.

<sup>1</sup> As reported by country dealers.

<sup>1</sup> Minus (-) sign indicates loss.

Table 395.—Dairy products: Quantity produced, 1923-1930

Product	1923	1924	1925	1926	1927	1928	1929	1980
Creamery butter	1,000 pounds 1,252,214			1,000 pounds 1,451,768	1,000 pounds 1,496,495	1,000 pounds 1,487,049	1,000 pounds 1,597,027	1,000 pounds 1,595,231
Whey butter (made from whey cream) Renovated or process butter	1, 904 2, 802	1, 665 2, 813	1, 774 2, 519	2, 872 2, 505	1, 217 4, 286	1, 097 2, 716	1, 221 2, 531	2, 516 1, 850
American cheese: Whole milk Part skim Full skim Swiss cheese (including block) Brick and Munster cheese Limburger cheese Cream and Neufchatel cheese	83, 250 7, 100 10, 334	2,470 1,005 21,844 32,052 0,734 14,945	2, 793 3, 298 23, 457 84, 101 9, 163 17, 575	2, 927 1, 384 20, 883 31, 048 9, 639 18, 192	3, 390 1, 888 18, 141 31, 546 8, 842 25, 962	3, 048 16, 718 28, 960 7, 437 30, 589	19, 406 31, 763 8, 568 34, 405	3, 653 669 26, 393 33, 548 8, 473 33, 213
All Italian varieties of cheese. All other varieties of cheese. Cottage, pot, and bakers'	5,040	-	4, 325	5,003	5, 763	Į.	i i	
cheese	35, 527							
Skimmed Unskimmed Bulk goods—	2, 748 196, 058	187, 281	186, 807	154, 944	161, 355	139, 077	145, 922	121,626
Skimmed Unskimmed	102, 236 44, 860	47, 429	44, 758	55, 737	39, 668	38, 660	51, 689	62, 421
Total condensed milk_	345, 902	383, 335	348, 898	359, 452	346, 368	333, 826	401, 718	345, 110
Evaporated milk (unsweet- enod): Case goods— Skimmed Unskimmed Bulk goods—	1			1		l	Ì	i
Skimmed Unskimmed	92,008	82, 772		86, 833	101, 354	89, 336	151, 662	128, 203
Total evaporated milk.	1, 428, 979	1, 367, 213	1, 408, 960	1, 374, 052	1, 509, 354	1, 584, 601	1, 804, 930	1, 735, 214
Condensed or evaporated buttermilk Dried or powdered butter-	54, 833	1	1	1	1			1
milk Powdered whole milk Powdered skimmed milk Powdered cream Dried casein (skim milk or	13, 032 6, 560 62, 251 328	7, 887 69, 219	8, 931 73, 317	10, 768 91, 718	11, 464 118, 123	9, 605 147, 990	13, 202 207, 579	260, 675 400
buttermilk product) Malted milk Milk sugar (crude) Ice cream of all kinds (gal-	15, 331 2, 872	1 <i>5</i> , 889 3, 331	18, 050 5, 65	20, 673 4, 476	22, 116 4, 077	21, 128 5, 323	22, 850 8, 968	22, 691
lons)	173,412	181, 564	214, 382	215, 248	226, 756	232, 188	254, 618	240, 750

Bureau of Agricultural Economics. Compiled from reports of factories made direct to the bureau. The 1029 and 1930 statistics are the most complete since these reports were inaugurated in 1918. Some allowance, therefore, should be made for this when comparing 1929 and 1930 production with that of previous years.

Table 396,—Dairy products: Quantity produced, 1930, by months

Manufactured product	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Creamery butter	1,000 lbs. 108, 382 109 162	1,000 lbs. 102,252 116 116	1,000 lbs. 115,679 142 147	1,000 lbs. 133, 271 171 158	1,000 lbs. 184, 385 309 135	1,000 lbs. 189, 785 349 143	1,000 lbs. 167, 559 353 181	1,000 lbs. 137, 420 295 247	1,000 lbs. 122, 580 243 210	1,000 lbs. 120,247 120 120	1,000 lbs. 101, 974 135 137	1,000 lbs. 111,694 110	1,000 lbs. 1,595,231 2,516 1,850
Whole milk Part skim Full skim	8 8 8 8 8 8 8	23,031	88 88 88 88	34, 143 337 68	48, 545 380 97	88. 883 106	45, 582 348 130	33, 555 326 83	26, 705 294 38	23, 581 200 32		18,838 231	
Swiss cheese (including block)  Brick and Munster cheese Limburgar cheese				1, 385 3, 152	6,8,4 0,4,6	8,493	4.154 19861	2,548	2, 970	2,2 968 988	7, 686		
Cream and Neufobatel oheese	e. 888	2, 797 797 867 867 867 867 867 867 867 867 867 86	3,559					2, 424	2, 968 986 986 986	2, 636 576 576	2, 615 567	2, 722 551	83, 473 8, 213 9, 573
Cottage, Pot, and Baker's cheese	7. 523	7,645		8, 972	9, 587	9,231	8, 351	7, 859 859	7, 313	7, 665	7,186	7,239	
Skimmed Unskimmed Bulk goods—	209 12, 195	11,007	13,816	207 17, 263	246 10, 329	248 10, 051	9,231	7,046	163 5, 801	178 9, 164	176	88,758	2,092 121,626
Skimmed. Unskimmed. Evaporated milk (unsweetened):	11, 263	10, 312	13, 177 4, 270	14, 786 4, 533	20, 180 8, 683	18, 975 8, 552	14, 298	11, 556 5, 311	9, 977 4, 567	13, 263 4, 646	10, 517 3, 524	10, 637	158, 971 62, 421
Skimmed Caskimmed Bulk goods—	251 93, 836	238	325 113, 277	213 134, 188	246 174, 906	183, 592	47 153, 949	39 117, 440	24 97, 249	100, 330	57 89, 790	43 98, 163	1, 650 1, 449, 149
Skimmed Unskimmed Concentrated skim milk (for animal feed) Condensed or evaporated buttermilk	8, 925 7, 946 1, 861 6, 685	9,773 7,997 1,716		14, 070 10, 153 1, 723	18, 114 14, 941 1, 766				10,880	13,263 9,263 808,009			
Dried or powdered buttørmilk Powdered whole milk Powdered skim milk Powdered skim milk	4, 282			23, 1, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5,	29,628				4, 759 616 18, 551	2, 4, 61 28, 88, 44, 44, 44, 44, 44, 44, 44, 44, 4	3,852 765 19,408	20, 836	
Dried eastin Malied milk Milk sugar (crudo) Ice cream (all kinds), gallons	2, 962 2, 113 927 9, 977	2, 889 2, 025 835 11, 992	3, 545 2, 429 1, 029 14, 678	2, 165 1, 200 1, 200 19, 421	5,018 2,148 1,287 28,017	5, 195 1, 905 1, 371 33, 465	4, 024 1, 721 38, 070	3, 274 1, 768 877 30, 991	2, 793 1, 659 891 22, 316	2, 847 1, 827 1, 035 13, 043	2,409 1,538 1,005 10,167		400 22, 691 240, 779 240, 750
	_				_								

Burean of Agricultural Economics. Compiled from reports made direct to the burean,

Table 397.—Fluid milk and cream: Receipts <sup>1</sup> at New York, Philadelphia, Boston, and Chicago, by State of origin—1930 and 1931

(40-quart units) 2

State or origin	New	York	Philad	lelphia	Bos	ton	Chicago
Diago of Origin	1930	1931	1930	1931	1930	1931	1931
Fluid milk:							
Connecticut	206, 080	226, 755			40,051	5,965	
Delaware	5, 916	20, 745	558,870	509, 171			
Indiana Maine		521			400 050		
Maryland	190 129, 572	130, 314	883, 395	897, 193	466, 858	655,009	
Massachusetts	100, 046	142, 939			656, 230	628, 173	
New Hampshire		<u>:</u>			656, 230 786, 959	778, 265	
New Jersey New York	1,098,490	820, 525 24, 316, 614 12, 517	497, 308	531,023			
		24, 316, 614	9, 587 6, 290	3, 019 1, 110	593, 355	919,997	
Pennsylvania Rhode Island	1, 356 4, 880, 032	5, 195, 697	5, 298, 624	5, 194, 375			
Rhode Island	l				291	3, 834, 583	
Vermont	1, 233, 618	1, 203, 051			3, 633, 198	3, 834, 583	
Virginia West Virginia Wisconsin			41, 104	37, 120 69, 976			
Wisconsin	200		99, 829 310	691			
Canada	200 13, 874	5, 170					
Total			7, 395, 317	7, 243, 678	6, 176, 942	6, 416, 012	
Fluid cream:						4,859	
Arkansas	616		2,421	406		7,899	1,714
Connecticut	7, 182	6, 152	1		145		
Delaware	65	826	4,371	6, 035			
Illinois Indiana	1,016	600	2,754	2,000 97,298	200 7,300	1,400 12,897	259, 300 16, 606
Iowa	7,855 192	14, 130	73, 237 400	81,200	7,300	12,001	5, 299
Kansas			1, 268		1,400	2,495	389
Kentucky	1,400		4,822	1, 200		6, 210	8,875
Maine Maryland	2 2			25, 403	101, 910	75,005	
Massachusetts	3,300 6,441	886 2, 215	39, 214	20, 400	1,976	1,678	
Michigan	1,630	250	17, 292	6, 500	1 8,392	20,079	43,094
Minnesota	6,316	5, 483	19,334	8,018	7, 291	7,335	80
Mississippi Missouri	217		. 200				00 100
New Hampshire	4, 415	850	15, 367	7, 888	8, 003 29, 830	19,783 21,918	26, 102
New Jersey	16, 212	18, 275	589	1,991	200		
New Jersey New York	1, 350, 342	18, 275 1, 517, 191	8,083	21,004	35, 844	58, 684	
North Dakota		l					0.00
Ohio Oklahoma	21,904	17, 969	29, 260 1, 450	23, 894	11,690	17, 220	8,062 130
Pennsylvania Rhode Island	251,630	225, 457	46, 292	41,719		500	
Rhode Island					5		
Tennessee Texas	200	6,704	4,756 1,748	2, 155 1, 145	600	13, 523	8
Vermont.		76, 630	-, , , 70	1, 170	321,657	266, 386	
Virginia	L		31, 172	9,837			1
West Virginia Wisconsin			1.080	6,695			
Wisconsin Canada	18, 049 31, 152	3, 645 1, 339	92,010	75, 687	14,120 31,883	57,039	527, 334
validiti	01, 102	1, 339			01,000		
Total	1,842,405	1, 898, 602	393, 029	333, 875	582, <del>41</del> 6	588, 110	896, 996
		1	1		·		1

Bureau of Agricultural Economies.

<sup>&</sup>lt;sup>1</sup> Figures include both rail and truck receipts at Philadelphia and Boston, but rail receipts only at New York and Chicago. Receipts by truck at New York in 1931 were: Milk, 3,370,129 cans; cream, 14,793 cans. In 1930, milk, 2,141,514 cans; cream, 4,601 cans.
<sup>2</sup> 40-quart units equal 10 gallons, or about 86 pounds for milk and about 82.5 pounds for cream.

Table 398.—Milk, condensed and evaporated: International trade; average 1925-1929, annual 1927-1930

					Calend	ar year				
Country	A ve 1925-	rage -1929	19	27	19	28	70	20	198	30 1
	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports
PRINCIPAL EXPORTING COUNTRIES  Netherlands	1,000 pounds 319, 831 118, 215 76, 691 55, 666 32, 288 20, 852 18, 462 9, 842 8, 658 2, 582 1, 535 1, 401	1,000 pounds 291 2,830 35 17 142 70 789 1,335 1,538 2,037 364 23	1,000 pounds 324, 800 103, 028 81, 234 55, 304 33, 680 15, 725 16, 698 8, 905 6, 302 2, 615 315 1, 557	1,000 pounds 279 2, 624 111 14 125 96 747 1, 355 1, 494 998 141	1,000 pounds 354, 572 115, 551 82, 252 52, 597 27, 118 19, 975 18, 747 7, 093 10, 747 3, 516 2, 753 1, 367	1,000 pounds 359 2, 608 14 13 137 27 6,428 1, 282 1, 282 1, 296 228	1,000 pounds 378, 055 110, 155 110, 155 54, 934 26, 746 17, 395 15, 534 4, 821 10, 503 4, 360 2, 830 2, 175	1,000 pounds 139 2, 631 13 2 179 52 323 2, 124 1, 116 4, 099 271 7	1,000 pormds 393, 151 90, 459 72, 660 51, 916 20, 471 13, 447 5, 141 10, 321 7, 390 2, 754 2, 331	1,000 pounds 695 1,611 15 164 111 1,751 909 5,554 223 1
Total	606, 116	9, 531	650, 163	7,867	696, 288	8, 341	706, 026	10, 959	670, 041	11,034
COUNTRIES United Kingdom Cubs Dutch East Indies Philippine Islands British India Germany s France China Union of South Africa Japan Peru Slam s Indo-China Greece Jamaica Algeria Trinidad and Tobago Tunis Brazil Argontin	0 15 0 0 1,960 9,174 320 0 0 162 0 0 155 0 0 155 353 323 213 34	47, 460 27, 265 25, 810 22, 305 15, 793 12, 227 11, 305 11, 21, 217 8, 593 7, 076 6, 644 4, 198 8, 181 1, 356 8, 181 1, 418 1, 327	0 0 0 9, 454 0 29 399 0 174 0 0 2129 0 0 0 2 3 399 2 5 4 2 2 2 2 2 3 3 9 9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	25, 974 24, 933 13, 434 11, 299 11, 095 11, 330 9, 629 7, 847 5, 955 4, 103 2, 632 2, 644 1, 947 1, 1446 1, 395 1, 105 264	0 0 1, 477 12, 483 385 0 2 123 0 2 205 2 205 388 349 18	30, 875 26, 524 26, 354 13, 290 12, 271 14, 643 12, 020 8, 411 8, 444 8, 827 2, 7, 603 8, 043 8, 043 1, 355 1, 355 1, 355 1, 357 1, 347 464	0 0 0 4, 235 11, 520 0 16, 317 0 2 72 0 0 2 144 0 0 0 15, 504 371	34, 990 29, 875 27, 436 8, 264 14, 477 13, 285 8, 605 8, 607 7, 879 9, 779 24, 094 24, 094 25, 252 1, 252 1, 252 1, 247 385	0 0 0, 772 14, 608 0 0 0 0 0 0 0 0 17 123 676 7	20,077 27,280 4,351 14,964 11,353 4,310 8,396 5,129 4,130 3,118 1,204 1,550 1,808 1,384 267
1.0181	34, 201	513, 258	39, 591	516, 300	40, 511	545, 665	44, 927	548, 726	45, 877	188, 732

Bureau of Agricultural Economics. Official sources except where otherwise stated.

Table 399.—Milk: Estimated average price per 100 pounds received by producers, United States, 1923-1931

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug.	Sept.	Oct. 15	Nov.	Dec.
1923	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls,	Dolls.	Dolls.	Dolla,
1924 1925 1926 1927 1927 1928 1929 1930	2. 86 2. 48 2. 74 2. 68 2. 67 2. 64 2. 53 2. 04	2.84 2.55 2.68 2.64 2.69 2.64 2.44 1.96	2.75 2.62 2.56 2.55 2.61 2.63 2.38 1.92	2. 50 2. 48 2. 46 2. 58 2. 51 2. 59 2. 35 1. 85	2.40 2.47 2.39 2.51 2.49 2.53 2.28 1.73	2, 40 2, 47 2, 35 2, 44 2, 45 2, 47 2, 22 1, 66	2, 29 2, 45 2, 40 2, 40 2, 45 2, 46 2, 15 1, 62	2.18 2.55 2.37 2.36 2.46 2.50 2.18 1.64	2.35 2.56 2.47 2.48 2.56 2.52 2.25 1.70	2. 43 2. 73 2. 48 2. 55 2. 60 2. 55 2. 30 1. 72	2. 45 2. 69 2. 60 2. 56 2. 63 2. 59 2. 31 1. 73	2. 55 2. 65 2. 61 2. 64 2. 65 2. 60 2. 20 1. 67

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by number of milk cows Jan. 1, to obtain a price for the United States. Prices quoted are for milk sold to dealers, factories, etc.

Preliminary.
 International Yearbook of Agricultural Statistics.
 Exports include powdered milk.
 Imports include powdered milk.
 Includes some powdered milk.
 Figures for 12 months ending March 31 of following year.

Table 400.—Milk, standard or grade B: Retail price per quart, delivered to family trade in cities, 1931

City	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver- age
Boston New York. Philadelphia. Philadelphia. Philadelphia. Philadelphia. Philadelphia. Philadelphia. Chicago Detroit. Milwaukee Minneapolis. St. Louis. Kansas City, Mo. Washington, D. O. Jacksonville Louisville. Birmingham New Orleans Dallas Butte. Denyer. Salt Lake City Seattle. Portland, Orog. Los Angoles. San Francisco.	Cents 13½ 15 12 13 11 11 13 13 10 12 13 14½ 19 16 14 13 13 13 11 11 11 12 15 16 14 15 17 17 17 17 17 17 17 17 17 17 17 17 17	Cents 12½ 15 12 12 11 11 13 12 10 12 13 14½ 19 11 16 14 12 10 11 13 13 13	15 12 12 11 10 13 12½ 10 10 12 13	Cents 121/2 12 12 12 12 13 13 14 151/2 10 14 14 12 10 10 12 13 13 13 13 13 13 13	12½ 15 12 12 10 13 12 10 10 12 12 14 15½ 11 14 12 12 11 14 12 11 11 14 12 11 11 11 11 11 11 11 11 11 11 11 11	11 12 12 10 13 10	11 12 12 12 12 10 10	15 12 10 10 13 11 10 10 12 12 14 15 12 12 12 10	13½ 15 11 12 10 10 13 12 10 10 11 12 14 13¾ 12 10 10 11 12 14 13¾ 12 10 10 10 10 10 10 10 10 10 10 10 10 10	15 11 10 10 13 12 10 10 11 12 14 14 12 12 13 12 10 11	14 11 10 10 13 11 10 10 11 12 14 12 12 12 12 12 12 12 12	12 13 12 10 12 10 91/2	14% 11% 10% 10% 13 11% 9% 10 11% 12% 14% 14% 11% 13% 11% 12% 12% 12%

Bureau of Agricultural Economics. Compiled from reports of the bureau secured through the cooperation of milk distributors, producers' associations, and municipal officers.

Table 401.—Butterfat: Estimated average price per pound received by producers, United States, 1922-1931

Year	Jan. 15	Feb.	Mar. 15	Apr. 15	Мау 15	June 15	July 15	Aug. 15	Sept.	Oct. 15	Nov. 13	Dec. 15	Weight- ed aver- age
1922 1923 1924 1925 1926 1927 1928 1929 1930	Cents 33. 4 47. 0 50. 6 40. 6 45. 2 46. 9 48. 5 47. 6 36. 7 26. 2	Cents 34. 0 44. 9 48. 5 37. 9 43. 1 46. 8 46. 0 47. 8 35. 4 25. 0	Cents 34. 5 44. 9 46. 4 41. 5 42. 9 48. 0 46. 5 48. 3 34. 9 27. 5	Cents 33. 4 46. 0 40. 8 40. 5 40. 4 47. 1 45. 4 46. 5 37. 3 26. 4	Cents 33. 4 40. 3 37. 6 40. 3 39. 1 43. 6 44. 4 45. 4 36. 5 21. 2	Cents 33. 0 36. 9 37. 1 39. 9 39. 3 40. 8 43. 5 43. 6 31. 6 20. 5	Cents 34. 8 36. 7 37. 8 40. 5 38. 6 40. 3 43. 3 43. 4 31. 6 21. 1	Cents 32.8 38.7 35.8 41.3 38.6 39.4 44.3 43.3 35.2 23.9	Cents 35. 5 42. 2 36. 6 42. 6 40. 5 41. 6 46. 5 44. 6 37. 7 26. 6	Cents 39. 2 44. 1 36. 6 47. 1 42. 4 44. 4 47. 0 45. 6 37. 0 30 3	Cents 44. 2 47. 8 37. 0 47. 8 44. 8 45. 8 47. 6 43. 5 35. 3 28. 2	Cents 50.3 49.2 41.1 47.6 47.9 47.8 49.2 41.9 30.6 27.3	Cents 35. 9 42. 2 39. 8 41. 9 41. 3 43. 7 45. 6 44. 9 34. 8 24. 7

Bureau of Agricultural Economics. Quotations cover butterfat for all uses. Based on reports of special price reporters. Monthly prices by States, weighted by number of milk cows Jan. 1, to obtain a price for the United States; yearly price obtained by weighting monthly prices by production of creamery butter.

Table 402.—Creamery butter: Production reported by factories, United States 1932-1930

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1923 1924 1925 1926 1927 1928 1	97, 965 101, 045 103, 519	74, 134 86, 731 80, 218 94, 222 95, 522 99, 394 99, 963	88, 311 95, 760 92, 302 112, 432 111, 451 111, 777 114, 404	100, 547 106, 012 107, 023 121, 049 126, 415 118, 849 133, 684	134, 350 139, 954 145, 478 155, 912 168, 808 156, 294 174, 341	158, 371 161, 992 104, 253 178, 276 188, 792 181, 037 192, 869	138, 278 164, 443 158, 920 159, 554 170, 484 167, 601 185, 317	137, 836 136, 788 133, 294 146, 808 145, 430 152, 192	102, 273 115, 102 108, 325 116, 732 113, 546 119, 499 123, 582	89, 297 100, 536 104, 520 103, 068 102, 399 105, 894 118, 116	77, 282 85, 492 88, 481 86, 058 87, 745 97, 186	77, 254 82, 964 91, 136 90, 853 88, 247 92, 484 101, 854	1,000 lbs. 1, 153, 515 1, 242, 214 1, 366, 080 1, 361, 526 1, 451, 766 1, 496, 495 1, 487, 049 11, 597, 027 1, 505, 231

Bureau of Agricultural Economics. The 1929 and 1930 statistics are the most complete since these reports were inaugurated in 1918. Some allowance, therefore, should be made for this when comparing 1929 and 1930 production with that of previous years.

Table 403.—Creamery butter production in factories in the United States, by States, 1922-1930

			2000000	1000					
State	1922	1928	1924	1925	1926	1927	1928	1929	1980
	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds 517	1,000 pounds 348	1,000 pounds 256	1,000 pounds
Maine New Hampshire	596 309	402 424	568 271	479 137	547 90	72	44	28	202 22
Vermont	12, 289	11, 935	12, 294	9, 872	8, 305 2, 150	6, 732 2, 514	5, 469 2, 340	3, 776 1, 496	3, 581 1, 869
Massachusetts	2, 999 76	1,844 76	1, 790 105	2, 026 68	75	100	66	48	28
Rhode Island Connecticut	986	753	820	675	617	550	401	371	364
New England	17, 255	15, 434	15, 848	12, 757	11, 784	10, 485	8, 668	5, 975	6, 066
New York New Jersey	25, 474	18, 893	25, 974	16, 960	14, 222	12,864	11, 557 15	9, 104 14	9, 617
New Jersey Pennsylvania	261 12, 803	437 13, 142	642 12, 444	170 11, 476	49 11, 808	101 11, 709	11, 340	11, 113	10, 766
					26, 079	24, 674	22, 921	20, 231	20, 424
Middle Atlantic	38, 538	82, 472	39, 060	28, 606					
Ohio	84, 193 48, 158	79, 195	80, 932 54 355	77, 566	79, 386 57, 592 62, 544 72, 040	79, 603 62, 436	75, 681 60, 400 62, 864	80, 583 62, 701 69, 272	78, 972 63, 249 65, 281
Indiana Illinois Michigan	47, 249	51, 484 51, 359 64, 818	54, 355 58, 225 70, 676	54, 362 56, 872 70, 729	62, 544	62, 436 59, 875	62, 864	69, 272	65, 281
Michigan	59, 954	64, 818	70, 676	70, 729	72, 040 159, 733	69, 368 153, 545	65, 803 137, 483	63, 426 155, 815	65, 926 171, 644
Wisconsin	142, 235	139, 895	153, 335	161, 369					
North Cent. E	381, 789	386, 751	417, 523	420, 898	431, 295	424, 827	402, 240	431, 797	445, 072
Minnesota	170, 463 129, 778	199, 926	229, 474	245, 669	268, 437 168, 827 66, 861 34, 898 29, 814	274, 860 177, 224 62, 549 32, 462 32, 843 95, 004	271, 345	282, 884	282, 540
Iowa Missouri	129, 778 46, 565	141, 407	159, 378	156, 361 55, 953	86 861	82 540	60, 201	82 505	216, 058 77, 930
North Dakota	21, 675	23, 355	56, 801 28, 515 24, 643	31, 500	34, 898	32, 462	196, 068 69, 201 30, 889	214, 562 82, 505 41, 889	77, 939 41, 032
North Dakota South Dakota	21, 675 21, 146	51, 818 23, 355 27, 447 76, 748	24, 643	31, 500 29, 193 83, 930	20,814	32,843	34. 803	40.361	40, 406
Nebraska Kansas	74, 809 40, 204	42,674	81, 423 46, 844	83, 930 47, 768	90, 882 50, 998	50, 667	96, 472 55, 756	97, 110 58, 967	85, 623 56, 919
North Cent. W.	504, 640	563, 875	627, 078	650, 374	710, 717	725, 609	754, 584	818, 278	800, 517
Delaware	203	154	150	80	67	50	47	42	41
Delaware Maryland	542	382 10	500	339	266	229	223	172	95
Dist. of Columbia Virginia	475 3, 118	4. 231	4, 614	461 3, 842	4,878	5, 881	6, 051	5, 882	5, 255
West Virginia	420	4, 231 276	488	533	487	287	325	381	462
North Carolina	1, 549	1,718	1,683	1, 556	1,680	2,032 432	1, 849 392	2, 189 496	2, 050 453
South Carolina Georgia	165 979	537 1,868	527 1,826	429 1, 836	364 1, 982	3, 044	2, 224	2, 124	2, 397
Florida	81	99	20	22	105	129	153	93	107
South Atlantic	7, 532	9, 275	9, 786	9, 098	9, 381	12,084	11, 264	11, 379	10, 860
Kentucky	12, 010	12, 244	12, 942	14, 087	16, 975	19, 364	19, 822	20, 050	17, 645
Tennessee	9, 164	11, 463 831	12, 702 839	11, 286 1, 086	11, 826 991	17.190	15, 333 991	17, 929	15, 745
Alabama Mississippi	917 5, 778	5, 715		4, 895	6, 896	1, 237 7, 920	7, 241	2, 041 7, 429	2, 160 6, 048
South Cent. E	27, 869		32, 191	31, 354	36, 688	45, 711	43, 387	47, 449	41, 598
	731	996	1, 259	1, 174		1,710	1, 115	2, 778	2, 039
Arkansas Louisiana	87		125	90	92	324	461	882	705
Oklahoma	11, 142	14,065	14, 421	15, 841	19,664	23, 617	24, 277	25, 770	24, 654
South Cent. W_	10, 179 22, 139	10, 958 26, 202		27, 971	1		20, 599 46, 452	26, 511 55, 941	25, 083 52, 481
Wyoming	1, 403	1, 894	1, 941	1, 999	2, 289	2,009	1, 831	2, 320	2, 255
Wyoming Colorado New Mexico Idaho	16, 410	18, 625	18, 130	18,794	18, 255	20,871	21,614	21,024	2, 255 22, 643
New Mexico	7, 582	180	( 251	326 15, 101	455 18, 456	20, 918	421 20, 832	535	951 26, 353
Arizona	623	{ 600	2, 107	1,034	1,489	2, 150	2, 246	1.022	1,004
Utah	5, 913	7,500	8, 585	7. 034	8.037	1 9.909	9, 549	11,068	1 11.969
Arizona Utah Nevada Montana	2, 642 7, 713	2, 361 10, 667	2, 640 13, 874	2, 593 13, 968	2, 482 15, 549	2, 187 16, 759	2, 211 16, 364	2, 231 16, 684	1, 993 16, 792
Mountain	42, 415	51, 715	60, 959			75, 250	75, 068	80, 701	84, 950
Washington	24, 239	26, 666	29, 331 20, 993	25, 678	28, 914	29, 870	29, 452	30, 228	32, 256
Washington Oregon California	17, 158	18, 128	20, 993	21, 575 72, 371	22, 570	22, 831 75, 227	20, 963 72, 050	22, 413 72, 635	32, 256 26, 641
		81, 943							
Pacific Total	111, 338		125, 833						
1, Veat	1, 100, 010	1, 212, 214	1, 500, 080	1, 301, 320	1, 201, 700	1, 490, 490	1, 487, 049	1, 097, 027	1, 090, 231
	-								

Bureau of Agricultural Economics. The compilations are made from reports of factories to the bureau. The 1929 and 1930 statistics are the most complete since these reports were inaugurated in 1918. Some allowance, therefore, should be made for this when comparing 1929 and 1930 production with that of previous years.

Table 404.—Creamery butter: Receipts, gross weight, at five markets, by months, specified years

Market and year	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
New York: 1929 1930	20,877	19, 579	lbs. 20, 486 21, 523	lbs. 21, 895 22, 868	lbs. 26, 751 26, 723	lbs. 27, 936 29, 898	lbs. 29,700 27,567	lbs. 23, 854 19, 519	19, 690	<i>įbs.</i> 20, 983 19, 431	17, 910	lbs. 18, 095	1,000 lbs. 265, 760 268, 070 274, 218
*Chicago: 1929 1930 1931 Philadelphia:	18, 158 16, 837 16, 375	16, 356 16, 422 15, 584	18, 758 19, 877	19, 056 20, 317	25, 935 27, 431	30, 081 29, 585	27, 119 24, 689	22, 793 18, 189	17, 130 15, 979	16, 832 15, 191	15, 766 14, 319		244, 032 233, 638
1929 1930 1931 Boston:	6, 781 6, 956 7, 768	6, 144 6, 972	6, 674 7, 744	7, 119 8, 170	8, 263 8, 536	9, 183 10, 247	8, 127 7, 509	6, 127 6, 468	'	5. 640 6, 036	6, 342 5, 976 6, 660	7, 602 7, 676	83, 762 90, 585
1929 1930 1931 San Francisco:	6, 091 4, 615 5, 028	4, 266 4, 911	5, 225 5, 281	6, 257 6, 533	8, 646 8, 163	10,899 9,874	9, 640 8, 591	6, 524 6, 537	l '	3, 790 5, 292	5, 664	4, 534 5, 819	72, 455 77, 200
1929 1930 1931 Total: 1922	1, 590 1, 530	1, 555 1, 417	1,881	2, 566 2, 928	3, 138 3, 438 3, 134	2, 769 3, 009	2, 639 2, 300	1, 975 2, 440	1	1,467 1,743	1, 515 1, 886	2, 298	
1923 1924 1925 1926 1927	47, 843 44, 476 44, 825 46, 809	39, 877 47, 756 41, 785 46, 809	48, 955 52, 328 48, 351 54, 610	47, 947 51, 690 50, 035 53, 990	64, 328 67, 572 67, 454 64, 653	89, 976 91, 742 88, 024 89, 993	75, 330 92, 036 82, 918 81, 053	56, 243 67, 959 68, 341 59, 849	49, 307 56, 247 53, 303 52, 985	45, 393 49, 760 51, 599 45, 280	39, 759 35, 868 42, 090 40, 588	41, 460	646, 424 696, 905 681, 727 679, 480
1928 1929 1930 1931	50, 095 52, 490 50, 875	47, 797 48, 557 47, 966	54, 300 53, 979 55, 180	52, 158 56, 881 59, 127	63, 582 73, 879 74, 504	81, 318 81, 180 82, 334	75, 901 79, 442 72, 662	64, 531 64, 103 52, 334	52, 481 51, 972 47, 744	48, 907 50, 246 45, 528	42, 796 44, 739 43, 118	43, 092 46, 648 51, 291 55, 130	676, 958 704, 116 682, 663

Bureau of Agricultural Economics. Compiled from reports of bureau representatives in the various markets.

Table 405.—Creamery butter: 1 Cold-storage holdings, United States, 1922-1931

Year	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	July 1	Aug. 1	Sept. 1	Oct. 1	Nov. 1	Dec. 1
<del></del>	1,000	1,000	1,000		1,000							1,000
1922	48, 412	35,047	22, 582	9, 113	8,830	13, 202	67, 410	103, 151	112, 039	796, 680	73,857	47, 773
1923 1924 1925	20, 819 30, 209 65, 694		9,847	7,842	8,913	22, 348	74, 184	134, 118	156, 410	153, 494	76,472 135,018 94,916	100, 852
1926 1927	52, 785	39, 381 17, 952	26, 313 7, 952	17, 392 3, 011	17, 527 3, 436	30, 561 25, 401	86, 897 89, 996	131, 152 145, 147	138, 151 163, 701	125,342 147,390	100, 871 118, 679	61,381 83,221
1928	46, 289 43, 783	21,747	14,404	5, 532	5,883	28, 369	91, 962	151, 621	108, 952	158, 541	105, 811 138, 405	111,650
1930 1931	61, 935 63, 401				22, 957 17, 195	35, 155	80, 172	115, 121	101, 67	50, 152	109, 046 56, 229	42, 242

Bureau of Agricultural Economics. Compiled from reports made by cold-storage establishments.

<sup>&</sup>lt;sup>1</sup> Gross weight includes container and wrapping.

<sup>1</sup> Quantities given are net weights.

Table 406.—Butter: Receipts, gross weight, 1 at five markets, by State of origin, 1927-1931

						<del>,</del>	,				
Market and origin	1927	1928	1929	1930	1931	Market and origin	1927	1928	1929	1930	1931
NEW YORK	1,000	1,000 lbs.	1,000	1,000 lbs.	1,000	PHILA.—con.	1,000	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.
	LOR.	lbs.	lbs.	lbs.	lbs.		lhe l	lbs.	lbs.	lbs.	lbs.
Ala	220	370	154	159	110	Iowa Kans Ky Md Mich Minn Minn	5, 237	4, 808	6, 446	6, 220	6, 825
Ark Calif. Ga.	84 161	42 218	247	153 82	224 48	Kuis	313	384 212	135 130	70 111	387 365
Ga	38	86	39	137	120	Md	205	98	85	72	41
III Ind Iowa Kans Ky Md	37, 954	25 216	25 732	34, 307	25 128	Mich	1, 835	1, 356	568	1, 342	3, 029
Ind	5, 417 66, 935 8, 808	5, 150 68, 676 4, 797 884	4, 890 78, 347	4,799	5. 108	Minn	45, 478	54, 427	54, 499	52, 743	50, 864
Iowa	66, 935	68, 676	78, 347	74. 630	74, 145 7, 136	Miss	493	[טפט	214	268	335
Kans	3,808	4, 797	6, 520	7, 512	7, 136	Minn Miss Mo. Nobr. N. Y N. O Ohio Pa S. Dak Tenn Tex Va W. Va Wis Other States Canada	1, 444 4, 341	1, 921	2, 385	1, 767 2, 824	3, 115
MA	978 131	283	617 196	573 240	549 15	Ment	596	4, 271 690	5, 038 529	694	4, 093 859
Mass	223	66	15	87	206	N. O	33	5	96	148	77
Mich Minn Miss Mo Mont Nebr	13, 566	15, 227	7, 555	8,802	12, 691	Ohio	3, 162	2, 665	1, 934	1, 854	77 1, 201
Minn	57, 081	44,654	56, 333	65, 883	62, 081	Pa	1, 097 263	731	612	626	000
Miss	1, 251	812	1.070	623	795	8. Dak	263	418	582	215	401
Mo	6, 540 288	6, 182 296	6, 573 278	4, 345 337	5, 582 28	Tenn	1, 969 69	1, 742 26	2, 360 41	1, 967 222	978 842
Nehr	28, 457	28, 138	26, 803	26, 825	29, 877	Va	935	881	1, 289	605	990
N. J.	256	93	123	1	112	W. Va	277	225	53	55	06
N. Y	5, 385 340	5, 978	5, 097	7.119	4,837	Wis	6, 313	3, 307	4, 585 233	5, 395	4, 185
N. C	340	415	429	215	65	Other States -	586	290	233	188	640
N. Dak	573	2, 397 7, 498	2,052	2, 514	5, 798 7, 155	Canada					24
Omo	7, 565 363	7,498 502	6, 217 1, 302	6, 925 771	1, 417	Total	01 707	84, 495	87, 386	83, 762	90, 585
Nebr. N. J. N. Y. N. C. N. Dak. Ohio. Okia. Pa. S. Dak. Tenn.	1, 025	1,074	1, 923		1,850	10001	01, 141	04, 480	07,000	(10, 104	vu, 000
S. Dak	1, 129	1,290	1, 503	1, 982 1, 151	984	BOSTON					
Tenn	2, 369	2,305	2, 906 2, 304	2, 465	1,614						
Tex	359	831	2,304	995	930	Colo	22	867	442	83	129
Va.	473 310	535 26	467	244	273	<u> </u>	13, 557	12, 251	11, 893	12,065	13, 403
Va. Wash. Wis.	17, 615	15, 459	27 15, 839	29 13, 917	26 14, 503	Town	3,080	1,808 4,261	8, 495	2,812 4,307	2,917
Other States.	339	419	193	201	165	Kons	1, 532	1, 801	4, 257 1, 208	706	3, 173 557
Canada	89		2	47	600	Ky	228	298	580	222	47
m	201 000	070 700				IIIInd	346	168	15	3	^^
Total	261, 822	250, 593	265, 760	268, 070	274, 218	Mich	1,675	1, 787 33, 652	703	993	1, 279
CHICAGO						Minn	80,830	33,652	28,908	29, 119	32.710
						Minn Mo Mont Mont Nebr N. H N. Y N. Dak Ohio Okla Pa S. Dak Tenn Tex Vt Wis Othor States	3, 151 183	0,000	3, 221 29	2, 408 237	2, 224 87
Ark	130			118	229	Nebr	10, 335	12, 159	12, 315	7, 438	4, 746
Colo	678	1, 315	977	780	242	N. H	94	14	1 3	2	5
Ark Colo Idaho Iil.		7	8	27	-55-555	N. Y	2,607 1,871	1, 626 1, 227 2, 879	1, 380 2, 217 3, 214	1, 208	1, 954
		6, 371 943	8, 406 1, 098	15, 594	20, 061	N. Dak	1,871	1,227	2, 217	890	1,863
Iowa	89, 347	39, 948	44, 152	1, 217 39, 606	1, 375	Obje	2,751 664	575	825	2,912 510	4, 267 904
Ind Iowa Kans	9, 989	12 981	11, 185	9,928	42, 450 15, 283	Pa.	240		192	81	250
Ky Mich Minn	1, 888 1, 024 48, 057	12, 981 1, 894	2,067	1,353	989	8. Dak	3, 526	2,985	2,851	1,911	2, 562
Mich	1,024	923	1 854	576	877	Tenn			104	119	148
Miss.	31	50, 230 49	54, 043 239	46,380 143	39, 550	Tex	27	170	550		461
Mo	18, 484	11, 508		12, 487	290 14,866	Wie	2, 318 2, 238	1, 974 2, 057	781	2 200	154 2,885
Mont	194	165	235	159	3	Other States	872	665	1,679 231	3, 202 441	192
Miss. Mont. Mont. Nebr. N. Y N. Dak. Ohio. Okla. S. Dak. Tenn. Tex. Wis. Other States Canada.	17,090	19, 498	17, 450	16, 225	15, 136	Canada	5	2			
N. Y	3E	275	35	107	22	11	0.00			1	
Ohio	2, 104	2, 919 128	3, 287 78	2,384 251	3, 053 607	Total	×4, 617	87, 321	81, 183	72, 455	77, 200
Okla	4. 510	2, 329	3, 175	3, 104	4,507	SAN FRAN-					
S. Dak	16, 513	18, 270	16, 187	13, 496	12,855	CISCO	l			į i	
Tenn	438	113	166	75	31	li .	1				
Tex.	3,680	2, 322	2, 325	1.483	2.020	Calif	18, 970	17, 732	19,070	18, 110	18, 473
Other States	04,611	58, 108 150	65, 356 134	68, 047	68, 190 153	Colo	406		159	03	144
Canada	024	100	154	98	103	I Idano	1,722	1, 255	1,361 1,222	1, 223 2, 018	1, 515
						Nobr	2, 173 77	2, 150 33	1, 222	2,018	1,424 37
Total	235, 200	230, 514	244, 632	233, 638	243, 695	Nov	113	74	41	184	14
						Ore	2, 253	1 704	2,748	2,489	3, 687
PHILADELPHIA	1					Colo	223	384	134	35	88
PILATIA	1					Wash Other States_	300	182	231	495	1,340
Ala	168	30	26	17	103		466	166	108	4	29
TH	4,807	3,811	4, 023	4, 652	9, 166	Janada					
Ind	1,736	1,502			9,166 1,298	Total	26, 709	24, 032	25, 155	24, 738	26, 692
			1	ı		201	1	1 1 7 7		1	,

Bureau of Agricultural Economics. Compiled from reports of bureau representatives in the various markets.

<sup>&</sup>lt;sup>1</sup> Gross weight includes container and wrapping.

Table 407.—Butter: International trade, average 1925-1929, annual 1927-1930

					Cale	endar yea	r			
Country	A ve 1925-	rage -1929	192	7	19	28	19	29	193	0 1
	Ex- ports	Im- ports	Exports	Im- ports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EX- P O R T I N G -										
COUNTRIES	1,000 pounds	1,000 pounds		1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
Denmark New Zealand Australia 2 Netherlands	310, 967 156, 179	1,886	163,020	1,826	325, 710 162, 352	1,621	350, 616 185, 226	1, 424	372, 553 211, 035	1,388
Kussia	1 62, 901		75, 088 105, 714 71, 747	10, 935 4, 041 0	112, 811 103, 485 71, 888	2, 561 5, 123 0	102, 913 104, 323 55, 933 37, 547	4, 469 0	92, 393 23, 197	4, 396 0
Argentina Irish Free State	50, 410 58, 409	199	46, 808 65, 576 40, 707	4, 836 63	44 190	5, 879 93	54, 960	4,478	51, 156 58, 766	3, 391 19
Finland Latvia	31,509 24,641	42 0 6	33, 238 23, 724	0	29, 488 28, 673	3 0 31	36, 610 32, 694 27, 247	3 0 1	37, 726 40, 633	0
Finland Latvia Estonia Poland France	17, 426 15, 848	350 6, 796	21,039	141 10,851	24, 741 24, 194 22, 227 1, 779	77 5, 217 3, 565	33, 248 16, 722	112 9, 753 1, 937	31,010 26,713 12,095	30 12, 922 3, 131
Italy Yugoslavia	3, 985 571	1,600 2	2, 805 769	2,085	1, 779	3,505	1, 651 635	1, 937	1, 843 655	3, 131
Total	992, 666	25, 039	1, 004, 056	34, 787	1, 053, 314	24, 177	1, 103, 099	22, 208	1, 018, 580	25, 286
PRINCIPAL IM- P O R T I N G - COUNTRIES										
United King- dom	1,465	647, 350	1,703	625, 144	1,395	666, 231	1,096	702, 719	1, 115	744, 623
Germany Switzerland Canada	275 155 8, 510	249, 016 18, 070 14, 638	191 159 2,696	238, 682 18, 727 11, 200	281 150 1,995	279, 000 18, 061 16, 802	337 158 1, 400		578 40 1, 180	293, 557 18, 795 38, 606
Dutch East In-	0	9.758		9, 169	0	11, 086 4, 659	0 3, 721	11, 098 2, 773	0 2, 954	10, 910 2, 472
United States Belgium Austra	4,558 2,490 932		4, 343 2, 957 440	8, 460 2, 559 4, 220	3, 898 8, 712 1, 094	2, 917 1, 785	3, 009 2, 211	9, 559	2,648	22, 413 544
Union of South Africa Egypt	839 53	2, 420 2, 341 2, 055	334 86		393 51	3, 921 1, 774	2, 337 30	2, 158	2, 904 23	1, 690 2, 935
Algeria Norway British Malaya	48 421 187	1,846	25 153	2, 511 1, 763	<sup>2</sup> 41 82 181	1, 533 2, 196	1, 191 1,77	1,352 1,930	236 193	1, 529 2, 067
Cuba Peru China	5 5 0	1,780 1,708 1,661	Ö	1,878 1,444 1,530	3 2 0	1,204 2,116 1,945		1,481	4	1, 417
Greece Philippine Is-	3.0	1, 251		1,625	0	1, 172		1, 537		1,420
lands Czechoslovakia_ Trinidad and	605		369		1, 290		716	835	695	714
Tobago Spain	0 328		303		0 170	823 467	0 177		160 0	1, 058 329
Total	20, 876	974, 577	13,816	940, 953	14, 744	1, 022, 590	16, 650	1, 097, 529	16, 879	1, 146, 715

Bureau of Agricultural Economics. Official sources except where otherwise noted. Butter includes all butter made from milk, melted and renovated butter, but does not include margarine, cocoa butter or ghee.

Proliminary.
 International Yearbook of Agricultural Statistics.
 2-year average.

Table 408.—Butter, 92-score creamery: Average wholesale price, at five leading markets, by months, specified years

Market and year	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avor- ago
New York:	Cents												
1910	33	30	33	31	28	28	28 25	29 26	30	30	31	30	30
1911	26	26	24	21	22	23	25	26	27	30	34	37	27
1912	39	32	31	33	30	27	27 27	27	30	31	34	37	30 27 32 32 30 30
1913	35	36	37	35	29	28	27	28	32	31	34	36	32
1914	33	29	28 30	25	26	27	28 27	30	31	32	35	34	30
1915	34	32		31	29	28	27	26	27	29	31	35	30
1916	33	34	37	36	31	30	29	31	84	35	39	40	31 43
1917	40	44	42	44	40	39	39	41	44	45	46	50	43
1918	52	50	44	42	42	44	45	46	56	58	68	69	51
1919	62	52	62	64	58	52 57	53	55 55	59 59	68 60	71 63	72 55	61 61
1920	65	66	67	71	61		57 40	43	43	47	45	44	01
1921	52	47	48	46	32	33 87	36	35	45	46	51	54	40
1922	37	37 50	38 49	38 46	38 42	39	39	44	46	48	53	55	47
1923	52 53	50	47	38	39	41	40	90	38	30	43	45	48 41 47 43 45 44 47 47 47 45 37
1924	40	41	48	45	43	42	43	38 43	48	51	51	49	45
1925	45	45	43	39	41	41	40	42	45	47	51	55	44
1920	49	52	50	50	43	43	42	42	46	48	50	52	47
1928	49	47	49	45	45	44	45	47	49	48	51	50	47
1929	48	50	48	45	44	44	42	43	46	46	43	41	45
1930	37	36	37	30	35	83	35	39	40	40	36	32	37
1931	28	28	29	20	24	23	25	28	32	34	31	31	28
Chicago:										1			
1927	48	50	49	48	41	40	40	41	45	46	48	51	46
1928	47	46	48	44	43	43	44	46	47	46	49	49	46
1929	47	49	48	44	42	42 32	41	42	45	44	41	39	46 44 35 27
1930	35	35	37	37	34	32	85	38	38	38	34	31	35
1931	27	27	29	24	22	22	24	27	30	32	30	29	27
San Francisco:						ł .		1				}	ì
1927	47	48	45	42	41	42	42	44	47	48	49	48	45
1928	46	45	43	40	42	43	46	48	50	51	49	50	46
1929	46	47	45	43	45	45	45	46	49	48 37	48	42	46
1930	36	38	38	39	37	34	34	37	39	37	84	33	46 46 36 28
1931	26	28	28	24	25	25	26	30	31	32	32	30	28
Philadelphia:	50	52	51	51		43	43	43	47	1 40			1 40
1927	50 50	48	50	46	44	45	46	48	50	49	51	53	48
1928	49	51	49	46	45	45	43	44	47	47	52 44	51 42	40
1930		36	38	40	36	34	36	40	41	41	37	33	90
1931	38 30	29	30	27	25	24	26	29	34	35	32	32	48 48 46 38 29
Boston:	30		30	2"	20	-	20	20	0.2	90	02	02	29
1927	50	52	51	51	44	43	42	42	46	48	48	50	17
1928	49	47	50	46	45	44	45	47	49	48	50	50	47 48
1929	48	50	49	46	44	44	43	44	46	46	43	41	46
1930	37	36	38	39	35	33	36	39	40	40	36	33	37
1931	29	29	29	27	24	24	25	28	32	34	31	31	45 37 29
	1	1	1	1	1	1 -	1	1 -0	1	1	1	1	1

Bureau of Agricultural Economics. Compiled from Urner-Barry reports, 1910-1917 (New York), average of daily range; subsequently from reports of bureau representatives in the markets. Earlier data available in 1925 Yearbook, p. 1094, 1927 Yearbook, p. 1082, and 1931 Yearbook, p. 921.

Table 409.—Butter: Average export price per pound in Copenhagen, Denmark, 1922-1931

Year	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver-
1922	Cents 31, 1 40, 5 40, 0 42, 0 36, 5 36, 4 35, 4 39, 1 32, 0 26, 7	Cents 31, 0 41, 3 39 5 45, 4 40, 2 39, 3 37, 5 39, 0 35, 3 29, 5	Cents 32. 9 41. 0 36. 9 46. 1 38. 8 36. 8 40. 0 35. 5 31. 7 27. 0	Cents 33. 8 34. 5 31. 3 40. 6 36. 2 35. 2 36. 8 32. 8 27. 4 24. 3	Cents 33. 5 20. 5 36. 4 36. 9 34. 8 32. 9 35. 4 26. 3 23. 3	Cents 37. 0 29. 3 33. 4 39. 4 35. 7 33. 2 34. 9 35. 1 27. 7 23. 3	Cents 39, 4 30, 7 37, 8 40, 5 35, 4 32, 2 36, 4 35, 3 30, 3 23, 2	Cents 39. 1 34. 7 41. 1 44. 2 36. 1 35. 0 38. 0 35. 6 29. 2 24. 5	Cents 41, 1 40, 3 42, 3 45, 7 86, 6 39, 6 40, 2 39, 7 29, 9 24, 5	Cents 40. 7 38. 9 46. 1 46. 5 36. 3 39. 4 40. 5 40. 5 30. 1 21, 2	Cents 39. 9 39. 4 44. 2 44. 6 34. 9 41. 2 40. 6 38. 7 27. 2 19. 9	Cents 39. 7 41. 4 46. 8 37. 8 37. 1 38. 0 42. 4 35. 8 27. 3 18. 8	Cents 36. 6 36. 8 39. 6 42. 5 36. 6 36. 6 38. 1 29. 5 23. 8

Bureau of Agricultural Economics. Danish Butter Journal (Smor Tidendo) official quotations. For earlier years, 1882-1921, see the United States Department of Agriculture Yearbook, 1923, p. 923.

Conversions from Danish quotations January, 1922 to December, 1926, Inclusive, from weekly quotations in kroner per 100 kg., at average monthly acchange rate as quoted by Federal Reserve Board, Beginning January, 1927, to date at par of exchange.

Table 410.—Butter, creamery: Average wholesale <sup>1</sup> prices per pound, all scores, by months, New York and Chicago, 1931

### NEW YORK

Month	93	92	91	90	89	88	87	86	Cen	tralized lots	car
									90	89	88
January February March April May June July August September October November December	Cents 20, 50 29, 35 29, 88 27, 70 21, 33 25, 95 29, 11 33, 50 34, 76 31, 93 31, 55 29, 30	Cents 28. 50 28. 48 28. 10 23. 70 23. 33 24. 95 28. 12 33. 76 30. 93 30. 55 28. 31	Cents 28. 16 27. 90 28. 47 25. 85 23. 34 22. 90 24. 50 27. 66 31. 52 32. 61 30. 34 29. 85	Cents 27. 83 27. 31 25. 63 22. 97 22. 32 23. 79 26. 90 30. 19 29. 60 28. 48 26. 85	Cents 27. 20 28. 64 27. 38 25. 36 22. 27 21. 60 23. 05 26. 18 27. 67 28. 44 28. 92 26. 90	Cents 20, 44 25, 94 25, 02 21, 81 20, 95 22, 22, 41 26, 94 27, 85 28, 32 25, 92 25, 28	Cents 25. 90 25. 23 26. 06 24. 78 21. 28 21. 28 21. 64 24. 60 26. 24 27. 13 27. 64 25. 19	Cents	Cents	Cents	Cents

#### CHICAGO

January February March April May June July August September October November	28, 10 27, 91 29, 44 25, 12 23, 12 23, 04 24, 60 27, 94 31, 01 32, 93 30, 45	27. 35 27. 15 28. 69 24. 37 22. 37 22. 30 23. 85 27. 19 30. 26 32. 18 20. 70	26. 61 26. 51 28. 12 24. 05 21. 82 21. 62 23. 14 26. 25 29. 16 31. 03 28. 79	26. 04 20. 01 27. 65 23. 78 21. 43 21. 13 22. 59 25. 47 27. 98 29. 76 28. 05	25. 54 25. 43 26. 94 23. 39 20. 85 20. 49 21. 88 21. 44 26. 52 28. 25 27. 05	24. 08 24. 84 26. 28 22. 96 20. 28 19. 88 21. 00 23. 23 25. 48 20. 65 20. 11	24. 25 24. 07 25. 23 22. 46 19. 44 18. 87 20. 10 22. 33 24. 48 25. 65 25. 07	23, 75 23, 57 24, 69 21, 84 18, 86 18, 87 19, 31 21, 63 23, 98 25, 04 24, 48	27, 22 26, 90 28, 61 24, 46 22, 48 23, 97 26, 90 28, 98 31, 22 88, 20	25. 97 25. 85 27. 65 23. 58 21. 27 21. 21 22. 72 25. 05 26. 66 28. 09 26. 89	24. 97 24. 68 26. 25 22. 70 20. 31 10. 93 21. 19 23. 45 25. 41 26. 75 26. 15
December	29. 89 27. 80	29. 15 27. 05	27. 79 26. 24	26. 81 25. 56	25. 20 24. 67	24. 30 23. 83	23. 58	22. 91 22. 37	26. 40 26. 49	24. 64	24. 13

Bureau of Agricultural Economics.

Table 411.—Cheese, whole milk American Cheddar: Production in the United States, 1920-1930

Year	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1920 1921 1922 1923 1924 1926 1927 1928 1929 1930	1,000 lbs. 10,457 11,837 12,837 15,092 17,718 16,834 19,519 16,060 18,010 19,925 23,066	13, 927 15, 326 18, 886 17, 991 19, 984 17, 085	21, 318 23, 451	23, 521 21, 740 24, 014 24, 597 26, 889 29, 221 24, 533 28, 221 30, 181	84, 556 31, 349 32, 942 33, 657 38, 012 38, 598 34, 704 37, 324 42, 483	43, 517 45, 782 46, 320 41, 489 45, 012 51, 702	40, 716 43, 706	31, 822 33, 602 37, 659 33, 239 31, 944 34, 229 37, 811	23, 612 25, 581 28, 648 30, 539 31, 548 28, 809 25, 783 30, 342 30, 824	21, 496 25, 785 25, 566 26, 210 28, 253 23, 164 23, 012 25, 134 25, 961	13, 426 18, 382 18, 236 17, 252 20, 349 16, 386 16, 717 18, 013 19, 655	18, 619 15, 295 16, 337 16, 440 20, 184	324, 695 347, 240 335, 915 307, 777 335, 253 370, 314

Bureau of Agricultural Economics. The 1929 and 1930 statistics are the most complete since these reports were inaugurated in 1918. Some allowance, therefore, should be made for this when comparing 1929 and 930 production with that of previous years.

 $<sup>^1</sup>$  Principally sales by first-hand receivers to jobbers, chain stores, or other large distributors, in less-than carload lots, except as otherwise indicated.

Table 412.—Cheese, whole-milk American Cheddar: Production, United States, by States, 1921-1930

									<del></del>	
State	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930
VermontOther New England States	1,000 lbs. 1,380 79	1,000 lbs. 954	1,000 lbs. 1,200	1,000 lbs. 1,755		1,000 lbs. 1,114 128	1,000 lbs. 629 96	1,000 lbs. 603 147		
New England	1,459	954	1, 200	1, 789	1, 126	1, 242	725	750	788	1, 484
New York New Jorsey Pennsylvania		47, 726 634 2, 209	196	155				31, 075 2, 196	l	307
Middle Atlantic	41, 178	50, 569	40, 141	38, 513	39, 750	33, 344	26, 681	33, 271	27, 312	31, 275
OhioIndiana. Illinois Michigan. Wisconsin.	117	62 2.401	78 2.875	306 2,498	198 2.444	234 2, 902	303 701 2, 836 5, 906 227, 447	936 4, 969 4, 115 7, 724 221, 775	8, 903 6, 016	11, 243 5, 132
North Central, East	190, 363	199, 691	<b>234, 3</b> 30	244, 223	267, 423	258, 291	237, 193	239, 510	266, 921	270, 537
Minnesota Iowa Missouri Others	5, 693 313 382 141	5, 291 344 96 190	224	530 105	501 252	8, 984 383 312 912	7, 556 410 484 1, 301	601 2, 377	991 4, 442	804
North Central, West	6, 529	5, 921	8,000	10, 779	9, 649	10, 591	9, 751	17, 174	22, 983	20, 709
South Atlantic	184	226	277	276	155	110	104	754	1, 365	858
TennesseeOthers	50 20	71	284 51	308	321 37	172	154 15			2, 518 6, 378
South Central, East	79	71	335	308	358	172	160	4, 255	9, 299	8, 896
South Central, West	15	51		37		5		1, 433	3, 329	4, 203
Wyoming Idaho Utah Montana Others	1, 543 2, 117 1, 027 113 529	3, 416 3, 868 8, 219 259 187	5, 311	792	1, 923 7, 820 1, 753 i, 296 482	1,809	2, 205 1, 435	2, 592 2, 347	2, 794 1, 873	8, 301 2, 904 1, 567
Mountain	5, 329	10, 449	10, 200	12, 881	12, 774	14, 047	14, 531	17, 913	17, 336	18, 235
Washington Oregon California	1, 910 8, 777 5, 904	2, 928 8, 720 3, 220	2, 762 7, 678 3, 032	9, 951	9, 903	11,517	11,435	11,051	12, 530	14, 727
Pacific	16, 501	14, 874	13, 522	15, 799	16, 005	18, 113	18, 563	20, 154	20, 981	22, 619
Total	261, 727	282, 806	308, 014	324, 695	347, 240	335, 915	307, 777	335, 253	370, 314	378, 816

Bureau of Agricultural Economics. The compilations are made from reports of factories to the hureau. The 1929 and 1930 statistics are the most complete since these reports were inaugurated in 1918. Some allowance, therefore, should be made for this when comparing 1929 and 1930 production with that of previous years.

Table 413.—Cheese: Receipts, gross weight, at five markets, by months, specified years

Market and year	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
New York: 1929 1930	1,000 lbs. 3,725 4,094 4,183	4, 212	1,000 lbs. 4,066 3,660 4,395	3, 977	4, 934	6, 247	4, 956	4, 368	1,000 lbs. 4,534 4,661 4,545	3,881	3,676	3, 499	1,000 lbs. 50, 911 52, 165 56, 005
Chicago: 1929 1930 1931 Philadelphia:	7, 262 5, 378 4, 163	4, 949	5, 511 5, 066 3, 656	5,001	5,586	5,702	5,980	5, 577	4,906	6, 053 4, 024 3, 307		3, 206	58, 866
1929 930 1931 Boston:	1, 220 1, 214 1, 307	1, 198 1, 295 1, 538	1,927	1, 461	1,929	2, 268	2, 279	1, 786 1, 709 2, 225	2, 214	2, 105 1, 790 2, 045	1,542	1, 539	
1929 1930 1931 San Francisco:	639 922 1, 213	978 1, 189 1, 144	1, 111	1, 220	1, 232 1, 330 1, 432	2,097	1, 894 1, 552	1,764 1,404	1,642	1,542	1,178	993	16, 882
1929 1930 1931 Total:	935 918 734	713 821 750	1, 140	1, 367	1,694	1,581	2, 326	1,535	1,087	1, 105 988 1, 154	896	766	15, 119
1921	10 734	11 258	14 789	15 585	10 14R	22 770	20 211	119, 206	17, 463	118. 323	115, 699	14.071	181, 622 199, 835 219, 037 215, 056 223, 556
1926 1927 1928	12, 707 14, 409	14, 916 14, 715	14, 956 14, 654	16, 922 16, 139	14, 972 21, 801 16, 253	21, 777 22, 134 19, 216	21, 973 24, 134 21, 741	20, 736 22, 556 18, 728	21, 522 18, 222	18, 996 18, 665	14, 278 14, 179	13, 826 11, 692	218, 248 196, 613
1929 1930 1931	12, 526	12, 466	12,904	13, 026	15, 478	17, 895	17, 485	14, 953	15, 289 14, 510 11, 948	12, 225	10, 783	10,003	178, 890 164, 199 148, 656

Bureau of Agricultural Economics. Compiled from reports of bureau representatives in the various markets. See 1927 Yearbook, p. 1084, and 1931 Yearbook, p. 924 for data for earlier years.

Table 414.—Cheese, American, and all varieties: Cold-storage holdings,<sup>1</sup> United States, 1922-1931

AMERICAN <sup>2</sup>

#### Oct. 1 Nov. 1 Jan. 1 | Feb. 1 | Mar. 1 | Apr. 1 | May 1 | June 1 | July 1 | Aug. 1 | Sept. 1 Dec. 1 Year 1,000 lbs. 40,852 57,927 67,905 71,913 1,000 lbs. 33, 130 36, 834 45, 239 46, 468 54, 069 52, 085 56, 386 66, 640 74, 986 63, 156 1,000 lbs. 46,580 55,839 65,864 66,634 73,681 69,119 75,862 83,914 93,773 73,693 1,000 lbs. 49,473 62,384 73,153 78,582 77,646 67,402 84,745 89,797 90,152 70,940 1,000 lbs. 37,291 55,105 58,705 66,495 63,881 55,140 77,258 76,669 75,736 66,053 1.000 1,000 lbs. 21,430 26,593 40,506 41,552 50,339 48,106 43,837 60,772 58,972 58,516 1.000 1.000 .000 1,000 lbs. 15,481 17,507 27,172 29,550 89,346 37,710 39,203 50,721 53,403 46,764 ,000 1,000 lbs. 10,868 14,077 26,202 26,147 35,597 84,332 32,177 44,983 43,239 44,792 1,000 lbs. 53,625 63,960 76,406 76,512 81,297 71,825 86,632 90,863 92,063 73,740 lbs. 10,745 14,465 28,294 27,716 38,041 87,188 33,294 48,175 46,507 45,277 /58. 15,006 20,693 35,160 34,647 42,587 41,383 38,189 52,665 53,208 52,304 27, 691 33, 617 49, 566 1923 1924 49, 506 49, 187 58, 457 56, 758 49, 014 71, 177 68, 930 67, 599 1925. 72, 491 60, 766 85, 126 83, 737 83, 074 60, 611 1928 1929\_\_\_\_\_ 1930\_\_\_\_\_ 1931\_\_\_\_\_

	ALL VARIETIES													
1922 1923 1924 1925 1926 1927 1928 1929 1930 1930	41, 594 45, 234 67, 221 67, 558 76, 649 74, 217 66, 184 88, 832 86, 075 83, 288	67, 531 64, 216 57, 906	50, 117 58, 175 56, 073 50, 263 67, 087	42, 413 40, 480 51, 285 49, 835	40, 235 39, 037 47, 450 47, 461 43, 761 57, 569 56, 940	(4,000	95, 221	90, 053 89, 965 92, 482 102, 077 113, 923	95, 211 95, 472 98, 473 92, 280 104, 224 110, 314 112, 061	78, 791 91, 282 97, 777 95, 385 87, 080 101, 251 107, 831 108, 767	88, 043 90, 866 89, 785 79, 834 100, 229 100, 558 101, 148	81, 084 72, 428 92, 903 92, 553 91, 775		

Bureau of Agricultural Economics. Compiled from reports made by cold-storage establishments, Changes in these tables made due to transferrence of current trading stocks to cold storage stocks from January 1, 1927, to December 1, 1931.

<sup>&</sup>lt;sup>1</sup> Gross weight includes container and wrapping.

Quantities given are net weight.
 The term "American choese" is intended to cover only those varieties known as twins, flats, daisies.
 Cheddars, longhorns, and square prints. It does not, therefore, include all kinds of choese made in America

Table 415.—Cheese: Receipts, gross weight, at five markets, by State of origin, 1927-1931

Market and origin	1927	1928	1929	1930	1931	Market and origin	1927	1928	1929	1930	1931
NEW YORK	1,000 lbs.	1,000 lbs. 5,132	1,000 lbs. 4,497	1,000 lbs. 6,145	1,000 lbs. 7,288	PHILADEL- PHIA-CON.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs. 87
Ind Iowa	3, 833 421	1, 923 178	1, 585 82	1,084 84	1, 539	Pa Wis	41 12, 723	4	57	91 15, 966 60	87 15, 915 237
Mass Mich Minn	440 279	64 837 179	365 937 188	93 844 329	68 704 266	Other States. Canada		166	75		
Mo	287	123 42 186	7 52 69	13 45 69	30 115 8	Total. CHICAGO	20, 396	21, 039	19, 973	21, 167	20, 949
N. J. N. Y. Ohio	11, 867 587	13, 390 646	11, 252 678	10, 866 617	8, 294 576	Calif	3 31	45 58	56 197	37 22	45 12
V+	202	745 16 24	588 33 220	466 43 1	(2) (2) (2)	Colo Ill Ind	43	2,900 255	1, 994 206	1,853 306	943 139
Va Wis Other States_ Canada	19, 258 280 1, 471	23, 002 248 1, 537	27, 068 372 2, 918	28, 835 204 2, 427	35, 456 78 1, 411	Iowa Kans Mich	26 550	296 36 137	278 35 192	98 39 246	76 27 49
Total				<u> </u>	56, 005	Moni.	2, 503 122 68	2, 979 583	2,999 181 1	1, 751 24 10	1, 132 20 1
BOSTON	2 261	1 945	1, 754	1, 387	1, 404	N. J. N. Y. Ohio	3, 489 532	445 4, 246 176	780 4,652 111	319 2,857 136	879 1, 323
III Ind Mo	143	1, 845 388 147	161	382 ( <sup>2</sup> ) 38	348 ( <sup>2</sup> ) 25	Pa S. Dak	532 138	479	230 20	60 16	23 28
Mass Mich N. H	200	65 422 2	37 322 1 2,847	132 5 2, 349	396 1 2,310	Tex	12 109, 504 1, 010 1, 742	82, 954 1, 084 567	67, 495 685 600	49, 447 683 567	36, 424 333 33
N. H N. Y Ohio Pa	.1 197	3, 787 110 56	10	12	70		123, 633				41, 555
Vt Wis Other States_ Canada	7, 170 221	9, 953 353 157	0, 260 407 59	9, 492 2, 910 2	11, 746 876 3	CISCO					
Total	14, 588	17, 362	14, 809	16, 852	17, 240	Calif Colo Idaho	1 241	3, 508 225 3, 334	3, 449 179 3, 303	4, 213 165 3, 413	3, 110 129 2, 907
PHILADEL- PHIA						Mont N. Y	192	91 160 572	3 3 734	221 1 784	2,907 (*) 637
III	3, 704 115 3	2, 701 110 2	3, 075 137	2,091 34	1,880 146	Oreg Utah Wash	3, 273	2,877	3, 374 59 17	5, 427 28 13	5, 0.33 34
Iowa Mich Minn	634 416	499 343	539 23	655 34	668 255	Wash WisOther States	2, 198 57	1,820 42	1, 136 36	759 95	904 43
N. Y Ohio	2, 462 86	2, 201 82	2, 145 52	2, 231	1, 688 10	Total.	12, 694	12, 676	12, 203	15, 119	12, 907
. ——————											

Bureau of Agricultural Economics. Compiled from reports of bureau representatives in the various markets,

Table 416.—Cheese, No. 1 American, fresh single daisies: Average wholesale price per pound, New York, by months, 1924–1931

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	A vor age
1924 1925 1928 1927 1928 1929 1930 1930	Cents 24 24 26 26 20 25 21 17	Cents 24 24 25 26 1 23 24 21 16	Cents 23 24 23 25 25 25 24 21 16	Cents 20 24 21 24 24 24 21 15	Cents 19 24 21 24 24 23 20 14	Cents 20 24 21 24 26 23 18 14	Cents 20 24 22 24 26 23 18 15	Cents 21 24 22 25 26 23 19	Cents 21 24 23 27 27 24 20 17	Cents 21 25 24 28 26 24 19 16	Cents 21 1 25 25 27 25 24 19	Cents 22 25 26 29 25 23 18 14	Cents 21 24 23 26 25 24 20 15

Bureau of Agricultural Economics. Compiled from reports of bureau representatives in the market. These wholesale prices are based upon open market sales made for cash or short-time credit, consideration being given to the prices at which the larger quantities are sold.

<sup>1</sup> Gross weight includes container and wrapping.

<sup>2</sup> Not over 500 pounds.

<sup>1</sup> Less than 10 quotations during month.

<sup>2</sup> Based on 11 months' quotations.

Table 417.—Cheese: International trade, average 1925-1929, annual 1927-1930

					Calend	ar year				
Country	Averag	e 1925– 29	19	27	19	28	19	29	193	0 1
	Ex- ports	Im- ports	Ey- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports
PRINCIAPL EXPORTING COUNTRIES Netherlands	1,000 pounds 198, 043	1,000 pounds 1, 292	1,000 pounds 214, 565	1,000 pounds 1, 284	1,000 pounds 202, 999	1,000 pounds 1,484	1,000 pounds 211, 234	1,000 pounds 1,445	1,000 pounds 206, 735	1,000 pounds 1,509
New Zealand Canada Italy Switzerland Denmark	171, 975 120, 606 76, 304 64, 236 14, 740	3, 419 9, 818 3, 538 971	167, 193 110, 533 70, 078 75, 059 11, 644	1, 721 13, 123 3, 638 1, 102	175, 534 114, 152 80, 466 62, 695 13, 417	1, 779 10, 206 3, 396 863	199, 258 92, 946 71, 802 69, 726 14, 513	2, 104 13, 975 3, 437 647	203, 054 80, 164 80, 974 66, 143 12, 628	1, 788 12, 562 4, 238 810
PRINCIAPL EXPORTING COUNTRIES  Netherlands New Zealand Canada Italy Switzerland Denmark Czechoslovakia Australia i Finland Yugoslavia Bulgaria Hungary Russia i Total	7, 843 6, 724 5, 951 4, 787 2, 150	2, 450 1, 212 42 318 18	8, 463 4, 813 6, 502 5, 826 5, 790	2, 534 2, 097 34 389 19	7, 922 9, 262 3, 634 4, 132 1, 932	2, 625 1, 007 39 325 15	7, 052 5, 131 4, 836 4, 937 2, 642	3, 348 548 44 370 11	8, 276 4, 682 4, 583 2, 465	2, 963
TotalPRINCIPAL IMPORTING	1, 870 3 645 675, 874	1, 720 \$ 184 24, 986	2, 609 1, 847 684, 922	1, 733 133 27, 814	1, 398  677, 543	23, 522	685, 780	27, 471	671, 548	25, 118
COTINTEDING	4, 509	331, 101	5, 363	325, 891	5, 852	333, 182	6, 388	331, 744	5, 579	315, 227 137, 458
United Kingdom Germany United States Belgium France Algeria Spain Austria Evynt	3, 311 4, 350 1, 174 82, 557	75, 680 38, 720 38, 671	3, 160 3, 410 1, 001 25, 595 210	36, 856	914 35, 122	36, 694	899	146, 569 76, 382 46, 455 51, 070 8, 474	1, 964 875 38, 921	68, 311 51, 106 65, 523
Anstria Egypt Cuba	1, 760 1, 252 5			7, 576 7, 553 6, 740	91 2,461 155	8, 667 6, 401 7, 085	2, 936 195	6, 970 5, 716 6, 526 4, 484	207 4, 494 121 10	5, 835 5, 636 7, 494 2, 867
Greece	40 862 271	3, 942 3, 681 2, 567	1, 224 212 0	9, 735 3, 228 2, 414 1, 997	21 764 133	2, 298 4, 344 2, 449 1, 938	<sup>3</sup> 178 796 123	3, 314 4, 000 2, 409 2, 346	744	2, 301 3, 777 2, 350 2, 161
Brazil	124 0	1,472 1,405 1,3 <sub>2</sub> 7	574 14	1, 395 1, 522 1, 313	145 46	1, 763 1, 501 1, 430	263 13	1, 555 1, 413 1, 683	550 28	1, 473
Tunis	-	1, 191 530	894 431	1, 452 537	927 298	1, 094 734	1, 347 409	841	1, 380 1, 954	749 450
Total	51, 201	687, 552	43, 865	698, 222	53, 521	681, 577	61, 987	705, 621	62, 157	718, 504

Bureau of Agricultural Economics. Official sources except where otherwise noted. All cheese made from milk, including "cottage cheese."

Table 418.—Oleomargarine, standard, uncolored: Average wholesale price per pound, Chicago, by months, 1922-1931

Year	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver- age
1922	Cents 19. 0 20. 5 22. 5 24. 5 21. 5 23. 5 23. 5 23. 5 17. 7	Cents 17. 5 20. 5 22. 5 24. 5 24. 3 21. 5 23. 5 23. 5 23. 5	Cents 17. 5 20. 5 21. 9 24. 5 23. 5 21. 5 23. 5 23. 5 23. 5 24. 5	Cents 17. 5 20. 5 20. 5 24. 5 23. 3 21. 5 21. 5 23. 5 14. 5	Cents 17. 5 20. 5 20. 5 23. 9 22. 5 21. 5 23. 5 23. 5 12. 8	Cents 17. 5 20. 5 20. 5 23. 5 22. 5 21. 5 23. 5 23. 5 23. 5 21. 5 23. 5 21. 5	Cents 18. 2 20. 5 21. 2 23. 7 22. 5 21. 5 21. 5 20. 5 10. 6	Cents 18. 5 20. 5 22. 5 24. 5 22. 5 21. 5 21. 5 23. 5 20. 5 10. 5	Cents 18. 5 21. 0 22. 5 24. 5 23. 5 23. 9 22. 0 23. 5 11. 9	Cents 18, 5 21, 5 23, 0 24, 5 22, 5 24, 5 23, 5 23, 5 20, 5 12, 7	Cents 19. 2 22. 2 24. 0 24. 5 21. 8 23. 5 23. 5 23. 5 23. 5 23. 5	Ceets 20. 5 22. 5 24. 5 24. 5 23. 5 23. 5 19. 0 13. 4	Cents 18. 3 20. 9 22. 2 24. 3 22. 8 22. 5 22. 5 21. 8 13. 3

Bureau of Agricultural Economics. Compiled from Bureau of Labor Statistics Wholesale Price Bulletins.

¹ These prices are for consignment to the wholesale trade.

<sup>&</sup>lt;sup>1</sup> Proliminary. <sup>2</sup> International Yearbook of Agricultural Statistics.

<sup>3-</sup>year average.

Table 419.—Oleomargarine: Materials used in manufacture, 1921-22 to 1930-31

	Year beginning July—													
Material	1921-22	1922-23	1923-24	1924-25	1925-26	1926–27	1927-28	1928-29	1929-30	1930-87				
	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000				
	pounds	pounds	pounds	pounds	pounds	pounds	pounds	pounds	pounds	pound				
Butter	1, 107	1, 576	1,900	1,509	2, 330	2,070	2,484 141,000	2,611 171,412	2, 616 185, 066	1,01				
Coconut oil	57, 394	65, 656	83, 059 26	79, 449 38	98, 307	107, 654 18	19	47	21	155, 95				
Coloring Corn oil	11	11	457	106	174	183	38		(1)	11				
Oottonseed oil	15, 420	18, 757	20, 640	20, 966	25,608	23, 372	24,801	28, 173	30, 214	22, 03				
Edible tallow.	10, 120		24	1111	93	219	70	26	16	(1)				
Milk	53, 939	59, 835	69,090	61, 924	72,662	73, 700	83, 115	94, 752	97, 753	77, 2				
Mustard-seed oil			38	27	34	53	56	12	48					
Neutral lard	27, 057	29, 568	32, 210	25, 674	25, 172	24,872	25,036	24, 189	19,632	10, 18				
Oleo oll	40, 980	46, 645	52, 265	44, 102	47,418	48, 741	45, 477	47, 185 5, 834	45, 322 6, 269	28,04				
Oleo stearine	4, 574	4,815	5,317	5, 250	5,314 3,082	5, 145 2, 552	5,532 1,738	1, 294	1, 189	5,48				
Oleo stock	2, 143 11, 625	2, 322 6, 922	2,756 5,656	3, 183 4, 392	5, 257	4,872	5, 459	6,617	5,714	5, 20				
Peanut oil Salt	16, 262	17, 998	20, 593	18, 725	20, 593	21, 683	25, 024	27, 311	28, 890	22, 9				
Soybean oil	10, 202	11,000	20, 000	10, 120	1	33			619	2, 26				
30 <b>3</b> 20011 011-1-1-1					_					,				
Miscellaneous	3, 417	2, 918	432	688	1,374	918	1,220	1,474	1,279	3, 18				
Total	233, 929	257, 023	294, 463	266, 234	307, 460	316, 085	361,069	410, 937	424, 648	334, 80				

Bureau of Agricultural Economics. Compiled from annual reports of the Bureau of Internal Revenue.

1 Not over 500 pounds.

Table 420.—Oleomargarine: Production and apparent consumption in the United States, 1924-25 to 1930-31

Year beginning July—		Production		Stocks begin-	77	Stocks	Appare sum	nt con- ption
Year beginning July—	Colored	Uncol- ored	Total	ning of year	Exports	end of year	Total	Per capita
1924–25 1925–20 1926–27 1927–28 1924–29 1929–30 1930–31	1,000 pounds 11, 280 13, 181 14, 502 15, 351 16, 306 17, 103 8, 847	1,000 pounds 204, 123 234, 866 242, 655 279, 348 316, 816 332, 021 268, 926	1,000 pounds 215, 403 248, 047 257, 157 294, 699 333, 122 349, 124 277, 773	1,000 pounds 2,607 2,720 2,942 3,299 3,187 4,191 4,694	1,000 pounds 887 1,256 942 732 633 931 604	1,000 pounds 2,720 2,942 3,299 3,187 4,191 4,702 2,494	1,000 nounds 214, 403 246, 569 255, 858 294, 079 331, 485 347, 682 279, 369	Pounds 1. 87 2. 12 2. 17 2. 46 2. 74 2. 84 2. 26

Bureau of Agricultural Economics. Production and stocks from reports of the Bureau of Internal Revenue. Exports from reports of the Bureau of Foreign and Domestic Commerce. See 1927 Yearbook, p.1088, for data for earlier years.

Table 421.—Chickens: Number on hand, January 1 and value in the United States, 1920-1931

	Chicken	s on han	d Jan. 1		Chickens on hand Jan. 1				
Year	Number of fowls	Price per head	Total value	Year	Number of fowls	Price per head	Total value		
1920 (census) 1921 1922 1922 1923 1924 1925	Thou- sands 859, 537 356, 168 396, 507 411, 469 449, 188 417, 755	Cents 97. 21 89. 30 80. 77 74. 61 76. 09 79. 20	1,000 dollars 349,509 318,058 320,259 306,998 341,765 330,871	1926	Thou- sands 424, 227 448, 665 463, 364 444, 481 470, 463 459, 402	Cents 88. 61 91. 07 86. 07 91. 30 93. 15 70. 49	1,000 dollars 375, 900 408, 619 398, 838 405, 798 438, 220 323, 849		

Bureau of Agricultural Economics.

Table 422.—Chickens: Estimated number and value per head on farms January 1, 1925-1931

			Numbe	Number chickens Jan.	Jan. 1					Va	Value per head	pg		
State and division	1925	1926	1927	1928	1929	1930	1931	1925	1926	1927	1928	1929	1930	1831
Majna	Thou- sands 1.957	Thou- sands 1.957	Thou- sands 1,898	Thou- sands 2,020	Thou- sands 1, 908	Thou- sands 2,051	Thou- sands 2, 159	Cents 125	-		"			Cents 125
New Hampshire. Vermont Massachusetts	1, 267 970 2, 030	1, 287 970 830	1, 242	7,1,336 040,4	1,991	1,331 1,095 2,162	7, 20, 1, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20	3888						311 140 140
Rhode island. Connecticut New York New Jersey. Pennecticut	13,945 13,945 13,945 17,652	1,5,4,5 8,4,8 8,4,	1,4,4,6 88,82 88,12 88,11	1, 961 14, 366 4, 674 19, 875	4,5j.4,9j 888.88 888.88	2,41,25 11,521 1	2,41,4,8 791,4,88 791,69 791,69 791,69 791,69	32128	352 <b>9</b> 5	25,25,51	1128	33.34.21	128 128 128 128 128 128 128 128 128 128	82228
North Atlantic	- 1	44,817	46, 164	47,711	46, 240	49,870	48, 617	118, 16	1 1	1 1	122.80	139. 27	135, 58	107. 51
Ohlo Indiana Illinois Michigan Wiennigan	21,245 17,710 22,995 28,995	22, 643 17, 356 13, 605 13, 805	23, 549 18, 310 14, 575 14, 919	23, 887 27, 470 15, 143 16, 143	23, 185 17, 331 14, 568 14, 467	24, 954 18, 735 28, 758 14, 952 15, 322	24, 878 18, 013 ' 26, 824 14, 967 15, 877	88888	52888	001 002 003 003 003 003 003 003 003 003 003	88 92 98 88 92 98	97 96 101 103 36	101 101 105 105	855 E E E
North Central, East.	91, 289	93, 932	98, 775	99, 129	96,634	102, 721	100, 559	85.33	95.42	96.30	90.83	98.36	100.26	74.17
Minnesota.  Towa.  Missouri  Morth Dakota.  South Dakota.  Forest	16, 20, 27, 28, 28, 28, 28, 28, 28, 28, 28, 28, 28	17, 087 31, 183 29, 937 5, 442 13, 030	17, 276 31, 276 31, 733 5, 263 13, 613 22, 630	16, 789 31, 783 31, 783 6, 168 8, 449 13, 787	17, 411 30, 603 6, 322 13, 471 471 409	18, 627 32, 308 32, 308 5, 669 14, 803 23, 596	24,783 30,408 5,389 26,923 27,773 139	525222	1239881	8882 72888	<b>648545</b>	\$588£82	8885488	222223
North Central, West	Į Ž	126, 193	129, 947		129, 693	138, 803	134, 465	68.39	80.05	83.94	78.14	84.88	81.63	60.03
North Central	215, 764	220, 125	228, 722	229, 757	226, 327	241, 524	235, 024	76. 56	86.61	89.28	84.18	91. 69	89. 66	66.08
Delaware Maryland Virginis West Virginis North Carolins.	13	1,4,0,4,8,4, 4,6,4,8,4, 4,6,4,8,4, 1,6,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,	1, 434 10, 361 10, 361 9, 345 9, 345 113,	1, 462 10, 898 10, 116 10, 116 4, 827	1, 289 9, 6511 8, 643 8, 675 8, 138	1, 402 10, 543 10, 543 4, 876 4, 169	1, 454 10, 214 4, 728 8, 634 4, 167	5588888	311 38 38 38 38	120 112 122 123 133 134 135	552828	528882	112 112 99 97 77	382222

Table 422,—Chickens: Estimated number and value per head on farms January 1, 1925-1931—Continued

			Number el	Number chickens Jan. 1	1.1					Val	Value per head	-pi		
State and division	1925	1926	1927	1928	1929	1930	1831	1925	1926	1927	1928	1929	1930	1931
Georgia Florida	Thou- sands 7, 254 2, 194	Thou- sands 7,086 2,150	Thou- sands 7, 632 2, 448	Thou- sands 8, 245 2, 667	Thou- sands 7,084 2,294	Thou- sands 7, 233 2, 530	Thou- sands 7,355 2,569	Cents 75 95	Cents 74 105	Cents 76 100	Cents 71 85	Cents 72 87	Cents 76 88	Cents 64 85
South Atlantic	42,271	42,085	45,023	47,722	42, 583	44, 330	43,827	81.95	88. 10	89. 03	84. 80	86.96	91. 49	73.37
Kentucky Tennesse. Alabama. Afketstppi Afkansas. Loutsiana. Oklahoma.	11.12.27 6,6,7,4,13 13,523 13,283 13,883 13,883 13,883 13,883	111 25,00 25	చడ్చాఇ.4.ష కిజ్ఞక్లు కిజ్ఞక్లు కిట్లా కిట్ల కిట్ క క క క క క క క క క క క క క క క క క క	2,4,7,7,8,4,2,8 83,1,7,7,8,4,2,4,2,8 15,2,8,1,4,2,1,4,2,1,4,2,1,4,2,1,4,1,4,1,4,1,4	11, 983 12, 712 6, 237 8, 684 15, 4307 22, 673	11, 790 12, 821 6, 655 6, 655 8, 748 8, 748 14, 678 14, 853 15, 853	11, 039 12, 077 6, 601 6, 590 6, 988 4, 380 14, 663 23, 576	#83583 #83583	¥6252548	36675882	23183333	822288	8288888	82222238
South Central	81,086	81, 155	89, 125	93, 801	87, 434	91, 028	85, 914	65.28	71.29	74. 72	70.45	73.38	77. 49	55.86
Montana Idaho. Idaho. Wyoming. Calorado. New Maxico. Urtah. Nevada. Nevada. Nevada. Organington. California.	2008 6. 1. 4.4.6. 2008 55.8. 1. 4.4.6.6. 2008 55.8. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	64. 8. 1. 4. 8. 8. 8. 8. 8. 8. 8. 8. 8. 8. 8. 8. 8.	24. 4. 1. 1.6.7. 841. 1.884. 1.18. 1	2,2,2,4,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,	22. 4.1 1. 7.4.7. 885. 20. 1. 1. 2.4.7. 10. 10. 1. 2.4.7. 10. 10. 10. 10. 10. 10. 10. 10. 10. 10.	2, 2, 2, 2, 3, 3, 3, 4, 4, 8, 2, 3, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	2, 690 948 948 1, 128 2, 712 2, 712 2, 849 17, 667	8881888493	15 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	85 85 85 85 85 85 85 85 85 85 85 85 85 8	88844888888	262555525 26255555555555555555555555555	88 88 87 77 77 77 87 88 88 88 89 89 89 89 84 11	8288888858588
Far Western	34, 557	39,035	39,631	44,373	41,897	43, 711	45,020	81,73	93.33	100.89	91, 11	94.73	98.85	78. 50
United States	417, 755	424.227	445.005	463, 364	411, 481	470, 463	459, 402	79.20	88.61	91. 07	86.07	91.30	93, 15	70.49

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Table 423.—Eggs: Annual layings per flock on farms of crop correspondents, by States, 1925-1931 1

New Hampsine		,						
Malne	State and division	1925	1926	1927	1928	1929	1930	1931
Vermont: 6, 272 6, 293 6, 344 6, 788 6, 685 7, 384 7, 384 10, 108 10, 9, 438 11, 004 10, 707 11, 636 11, 918 11, 904 11, 905 11, 905 11, 904 11, 901 11, 907 11, 645 12, 290 12, 600 11, 606 1	W. to a	Number				Number	Number	Number
Vermont: 6, 272 6, 293 6, 344 6, 788 6, 685 7, 384 7, 384 10, 108 10, 9, 438 11, 004 10, 707 11, 636 11, 918 11, 904 11, 905 11, 905 11, 904 11, 901 11, 907 11, 645 12, 290 12, 600 11, 606 1	Maine	8, 518	8, 317	8, 287	8, 567		9, 868	9, 953
Massachusetts	New Hampshire	9, 479	7,944	8, 594	9, 248	9, 290	9, 077	9, 494
Rhode Island.	Vermont.	1 8 979	6, 293	6,344	6, 786	6, 685	7, 384	7, 366
Annual Salmin	Massachusetts	9, 384	10, 160	9, 436	11,004	10,707	11,004	11, 911
Controllection	Knode Island	10, 534	10, 108	10, 588	11, 215	9, 536	11,856	11,987
New Jersey	Connecticut.		9,819	10,749	10, 965	11, 345	11,643	12, 260
New Agricy   11,889   12,193   12,201   12,017   12,294   12,309   13,071	New York	10, 117	10,065	10, 512		11,078	11,050	11, 354
North Atlantic	New Jersey	11, 889	12, 193	12, 201	12, 017	12, 294	12, 339	13, 075
Ohio	Pennsylvania	11, 403	12, 114	12, 619	12, 209	12, 589	12, 920	13, 346
Indiana	North Atlantic	10, 283	10, 543	10, 946	10, 880	11, 253	11, 567	11, 951
Indiana	Ohio		12,656	13, 221	12,770	12, 890	13, 701	13, 911
Milchigan	indiana	12, 102	12, 537	12, 938	12, 596	12, 643	12, 756	13, 029
Minnesota   10, 221   10, 245   10, 251   10, 352   10, 777   11, 45b   12, 170   10, 177   11, 45b   12, 170   10, 177   11, 45b   12, 170   10, 177   11, 45b   12, 170   11, 45b   12, 170   13, 431   14, 683   14, 689   14, 792   14, 682   15, 882   11, 885   13, 005   14, 285   14, 489   13, 932   13, 101   14, 075   14, 277   12, 382   11, 977   12, 382   11, 977   12, 382   11, 977   12, 382   11, 977   12, 382   11, 977   12, 382   11, 977   12, 382   11, 977   12, 382   11, 977   12, 382   11, 977   12, 382   11, 977   12, 382   11, 977   12, 382   11, 977   12, 382   11, 977   12, 382   11, 977   12, 382   11, 977   12, 382   12, 978   12	Luinois	11, 734	12, 280	12, 470	12,044	12, 099	12, 333	12, 431
Minnesota   10, 221   10, 245   10, 251   10, 352   10, 777   11, 45b   12, 170   10, 177   11, 45b   12, 170   10, 177   11, 45b   12, 170   10, 177   11, 45b   12, 170   11, 45b   12, 170   13, 431   14, 683   14, 689   14, 792   14, 682   15, 882   11, 885   13, 005   14, 285   14, 489   13, 932   13, 101   14, 075   14, 277   12, 382   11, 977   12, 382   11, 977   12, 382   11, 977   12, 382   11, 977   12, 382   11, 977   12, 382   11, 977   12, 382   11, 977   12, 382   11, 977   12, 382   11, 977   12, 382   11, 977   12, 382   11, 977   12, 382   11, 977   12, 382   11, 977   12, 382   11, 977   12, 382   11, 977   12, 382   12, 978   12	Michigan	8, 959	9, 594	10,084	10, 251	10.008	10, 345	10, 841
Milling   Mill	Wisconsin		9, 681	10, 163	10.477	10, 777	11. 455	12,078
Missouri	IVI III DOSOTA	10, 251	10, 245	10, 251	10, 352	10, 579	11, 391	11, 683
South Dakota	Lowa-	13, 431	14, 683	14, 689	14, 792	14, 632	15, 382	11,850
South Dakota	Missouri	13, 005	14, 285	14, 489	13, 932	13, 510	14, 075	14, 279
South Darots   10, 379   10, 704   10, 798   11, 323   11, 471   12, 382   11, 975   12, 765   12, 576   11, 473   11, 412   11, 736   11, 737   12, 756   12, 576   12, 576   14, 160   14, 917   15, 218   16, 223   15, 249   15, 559   16, 215	MOLIT Darora	7, 652	7, 889	7.448	7, 570	7, 320	7, 348	7,430
Nebraska	SOULH DAKNIA	10, 379	10,704	10, 798	11, 328	11, 476	12, 382	11, 972
North Central	Nebraska		11, 473	11, 412		11, 737	12, 750	12, 576
Delaware	Kansas	14, 160	14, 917	15, 218	15, 223	15, 249	15, 559	16, 212
Maryland         11, 692         12, 687         13, 659         12, 349         12, 785         12, 066         11, 682         11, 682         12, 687         13, 659         12, 349         12, 785         12, 066         11, 682         11, 682         12, 687         13, 659         12, 349         12, 785         12, 066         11, 682         11, 682         12, 683         8, 882         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 494         4, 776         4, 706         7, 190         8, 432         7, 320         6, 901         7, 162           Fordia         6, 678         6, 878         6, 894         7, 334	North Central	11, 462	12, 141	12, 379	12, 303	12, 284	12, 822	13, 021
Maryland         11, 692         12, 687         13, 659         12, 349         12, 785         12, 066         11, 682         11, 682         12, 687         13, 659         12, 349         12, 785         12, 066         11, 682         11, 682         12, 687         13, 659         12, 349         12, 785         12, 066         11, 682         11, 682         12, 683         8, 882         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 190         8, 779         8, 485         8, 494         4, 776         4, 706         7, 190         8, 432         7, 320         6, 901         7, 162           Fordia         6, 678         6, 878         6, 894         7, 334	Delaware	16, 696	17, 568	19, 660	19, 615	16, 541	14, 604	13, 093
Virginia         7, 977         8, 287         9, 032         8, 506         8, 442         8, 254         8, 599           West Virginia         8, 576         8, 682         5, 801         8, 882         8, 190         8, 579         8, 461           North Carolina         5, 782         5, 819         6, 372         6, 314         5, 580         5, 208         5, 241         5, 366           Georgia         5, 432         5, 399         5, 530         5, 484         4, 894         4, 776         4, 706         7, 372         7, 640         8, 023         7, 247         7, 320         6, 901         7, 162           Florida         7, 372         7, 640         8, 023         7, 247         7, 320         6, 901         7, 162           South Altantic         6, 678         6, 894         7, 334         7, 113         6, 618         6, 489         6, 500           Kantucky         6, 843         7, 408         8, 311         6, 945         6, 424         6, 785         6, 741           Tennessee         6, 645         7, 199         8, 035         7, 192         6, 618         6, 706         6, 622           Alabama         5, 569         5, 797         6, 100         5, 673	Maryland	11, 692			12, 349	12, 795	12, 066	11, 984
Nest Virginia	Virginia	7 077	8, 287	9, 032	8,506	8, 442	8, 254	8, 594
Georgia	West Virginia	8, 576		8, 801	8,882	8, 190		8, 460
Georgia	North Carolina	5, 782	5, 819	6, 372		5, 560	5, 208	
Georgia	South Carolina	4, 976	5, 338	5, 840				5, 366
Florida	Georgia.	5, 432	5, 399	5, 530			4, 776	
Kentucky         6,843         7,408         8,311         6,945         6,424         6,785         6,744           Tennessee         6,645         7,199         8,035         7,192         6,618         6,706         6,624           Alabama         5,569         5,797         6,120         5,402         5,521         5,457         5,533           Mississippi         5,234         6,095         6,110         5,673         5,162         5,019         5,011           Arkansas         5,578         6,098         6,454         6,216         5,083         5,642         5,600           Louislana         6,676         6,998         6,764         6,396         5,992         6,004         8,700           Oklahoma         9,576         10,962         11,841         11,001         10,969         10,988         10,243           Taxas         7,336         7,940         9,345         9,611         9,485         9,196         9,485           South Central         6,742         7,388         8,066         7,529         7,234         7,203         7,127           Montana         6,822         7,190         6,506         7,549         7,247         7,311	Florida	7, 372	7, 640	8, 023	7, 247	7, 320		7, 162
Tennessee.         6, 645         7, 199         8, 035         7, 192         6, 618         6, 706         6, 624           Alabama.         5, 569         5, 797         0, 120         5, 402         5, 521         5, 457         5, 538           Mississippi         5, 224         6, 095         6, 110         5, 673         5, 182         5, 019         5, 019         5, 014           Arkansas         5, 578         6, 098         6, 454         6, 216         5, 083         5, 642         5, 602         5, 642         5, 602         5, 604         5, 096         5, 922         6, 004         5, 700         0 klahoma         9, 576         10, 962         11, 841         11, 001         10, 969         10, 698         10, 241           Taxas         7, 336         7, 940         9, 345         9, 611         9, 485         9, 196         9, 485           South Central         6, 742         7, 388         8, 056         7, 529         7, 234         7, 203         7, 127           Montana         6, 822         7, 190         6, 508         7, 549         7, 247         7, 311         7, 260           Myoming         7, 240         7, 960         7, 554         8, 391         7, 784	South Altantic	6, 678	6, 894	7, 334	7, 113	6, 618	6, 489	6, 504
Tennessee.         6, 645         7, 199         8, 035         7, 192         6, 618         6, 706         6, 624           Alabama.         5, 569         5, 797         0, 120         5, 402         5, 521         5, 457         5, 538           Mississippi         5, 224         6, 095         6, 110         5, 673         5, 182         5, 019         5, 019         5, 014           Arkansas         5, 578         6, 098         6, 454         6, 216         5, 083         5, 642         5, 602         5, 642         5, 602         5, 604         5, 096         5, 922         6, 004         5, 700         0 klahoma         9, 576         10, 962         11, 841         11, 001         10, 969         10, 698         10, 241           Taxas         7, 336         7, 940         9, 345         9, 611         9, 485         9, 196         9, 485           South Central         6, 742         7, 388         8, 056         7, 529         7, 234         7, 203         7, 127           Montana         6, 822         7, 190         6, 508         7, 549         7, 247         7, 311         7, 260           Myoming         7, 240         7, 960         7, 554         8, 391         7, 784	Kentucky	6, 843	7, 408	8, 311	6, 945	6, 424	6, 785	6, 749
Alabama         5, 569         5, 797         6, 120         5, 402         5, 521         5, 457         5, 533           Mississippi         5, 284         6, 098         6, 110         5, 673         5, 162         5, 019         5, 019         5, 016           Arkansas         5, 578         6, 098         6, 454         6, 216         5, 983         5, 642         5, 016           Louisiana         6, 576         6, 968         6, 764         6, 396         5, 992         6, 004         5, 70           Oklahoma         9, 576         10, 942         11, 844         11, 1001         10, 969         10, 988         10, 243           Taxas         7, 336         7, 940         9, 345         9, 611         9, 485         9, 196         9, 485           South Central         6, 742         7, 338         8, 056         7, 520         7, 234         7, 203         7, 127           Montana         6, 822         7, 190         6, 508         7, 549         7, 247         7, 311         7, 255           Idaho         8, 378         9, 840         10, 087         11, 218         10, 886         9, 986         10, 06           Wyoming         7, 260         7, 269 <td< td=""><td>Tennessee</td><td>6, 645</td><td>7, 199</td><td>8,035</td><td></td><td>6, 618</td><td>6, 706</td><td>6, 624</td></td<>	Tennessee	6, 645	7, 199	8,035		6, 618	6, 706	6, 624
Mississippi 5, 254 6, 095 6, 10 6, 10 5, 673 5, 162 5, 019 5, 014 Arkansas 5, 578 6, 098 6, 454 6, 216 5, 983 5, 642 5, 600 Louisiana 6, 576 6, 968 6, 764 6, 396 5, 992 6, 004 5, 700 Oklahoma 9, 576 10, 962 11, 841 11, 001 10, 969 10, 698 10, 241 Taxas 7, 336 7, 940 9, 345 9, 611 9, 485 9, 196 9, 485 South Central 6, 742 7, 388 8, 056 7, 520 7, 234 7, 203 7, 127 Montana 6, 822 7, 190 6, 506 7, 520 7, 234 7, 203 7, 127 Montana 6, 822 7, 190 6, 506 7, 549 7, 247 7, 311 7, 255 Idaho 8, 378 9, 840 10, 087 11, 218 10, 886 9, 986 10, 066 Wyoming 7, 260 7, 908 7, 554 8, 391 7, 764 8, 439 8, 200 Colorado 8, 235 8, 913 8, 552 9, 510 9, 752 9, 546 9, 844 New Moxico 6, 235 6, 731 7, 314 7, 762 7, 694 7, 177 7, 944 Arizona 9, 482 9, 734 9, 704 8, 003 9, 202 9, 333 10, 087 Utah 7, 849 8, 983 9, 245 10, 080 10, 226 11, 423 11, 546 Nevada 7, 376 9, 865 9, 986 10, 986 10, 986 10, 986 10, 986 10, 986 10, 986 10, 986 10, 986 10, 986 10, 986 10, 986 10, 986 11, 986 11, 342 Washington 9, 865 9, 988 10, 986 10, 526 10, 607 10, 318 11, 342 Washington 9, 865 9, 986 10, 986 10, 986 10, 526 10, 607 10, 383 11, 342 Washington 9, 865 9, 986 10, 986 10, 522 10, 579 10, 005 10, 281 Oalifornia 8, 925 9, 500 9, 884 9, 507 8, 293 8, 795 9, 986 Oalifornia 8, 481 9, 050 9, 362 9, 593 9, 335 9, 223 9, 819	Alabama	5, 569	5, 797	6, 120	5, 402	5, 521	5. 457	5, 533
South Central         7, 336         7, 940         9, 345         9, 611         9, 485         9, 198         9, 485           South Central         6, 742         7, 388         8, 056         7, 529         7, 234         7, 203         7, 127           Montana         6, 822         7, 190         6, 506         7, 549         7, 247         7, 311         7, 250           Idaho         8, 378         9, 840         10, 087         11, 218         10, 886         9, 986         10, 056           Wyoming         7, 240         7, 968         7, 554         8, 391         7, 704         8, 439         8, 202           Colorado         8, 235         8, 913         8, 552         9, 510         9, 752         9, 546         9, 848           New Moxido         6, 235         6, 731         7, 314         7, 762         7, 694         7, 177         7, 944           Arizona         9, 482         9, 734         9, 764         8, 003         9, 020         9, 333         10, 087           Utah         7, 840         8, 933         9, 245         10, 080         10, 226         11, 423         11, 548           Nevada         7, 737         10, 482         9, 739 <t< td=""><td>Mississippi</td><td>5, 284</td><td>6,095</td><td>6, 110</td><td></td><td>5, 162</td><td>5, 019</td><td>5, 016</td></t<>	Mississippi	5, 284	6,095	6, 110		5, 162	5, 019	5, 016
South Central         7, 336         7, 940         9, 345         9, 611         9, 485         9, 198         9, 485           South Central         6, 742         7, 388         8, 056         7, 529         7, 234         7, 203         7, 127           Montana         6, 822         7, 190         6, 506         7, 549         7, 247         7, 311         7, 250           Idaho         8, 378         9, 840         10, 087         11, 218         10, 886         9, 986         10, 056           Wyoming         7, 240         7, 968         7, 554         8, 391         7, 704         8, 439         8, 202           Colorado         8, 235         8, 913         8, 552         9, 510         9, 752         9, 546         9, 848           New Moxido         6, 235         6, 731         7, 314         7, 762         7, 694         7, 177         7, 944           Arizona         9, 482         9, 734         9, 764         8, 003         9, 020         9, 333         10, 087           Utah         7, 840         8, 933         9, 245         10, 080         10, 226         11, 423         11, 548           Nevada         7, 737         10, 482         9, 739 <t< td=""><td>Arkansas</td><td>5, 578</td><td>6,098</td><td>6.454</td><td>6. 216</td><td>5, 983</td><td>5, 642</td><td>5, 600</td></t<>	Arkansas	5, 578	6,098	6.454	6. 216	5, 983	5, 642	5, 600
South Central         7, 336         7, 940         9, 345         9, 611         9, 485         9, 198         9, 485           South Central         6, 742         7, 388         8, 056         7, 529         7, 234         7, 203         7, 127           Montana         6, 822         7, 190         6, 506         7, 549         7, 247         7, 311         7, 250           Idaho         8, 378         9, 840         10, 087         11, 218         10, 886         9, 986         10, 056           Wyoming         7, 240         7, 968         7, 554         8, 391         7, 704         8, 439         8, 202           Colorado         8, 235         8, 913         8, 552         9, 510         9, 752         9, 546         9, 848           New Moxido         6, 235         6, 731         7, 314         7, 762         7, 694         7, 177         7, 944           Arizona         9, 482         9, 734         9, 764         8, 003         9, 020         9, 333         10, 087           Utah         7, 840         8, 933         9, 245         10, 080         10, 226         11, 423         11, 548           Nevada         7, 737         10, 482         9, 739 <t< td=""><td>Louisiana</td><td>6, 576</td><td>6,968</td><td>6,764</td><td>6, 396</td><td>5, 992</td><td>6,004</td><td>5, 700</td></t<>	Louisiana	6, 576	6,968	6,764	6, 396	5, 992	6,004	5, 700
South Central         7, 336         7, 940         9, 345         9, 611         9, 485         9, 198         9, 485           South Central         6, 742         7, 388         8, 056         7, 529         7, 234         7, 203         7, 127           Montana         6, 822         7, 190         6, 506         7, 549         7, 247         7, 311         7, 250           Idaho         8, 378         9, 840         10, 087         11, 218         10, 886         9, 986         10, 056           Wyoming         7, 240         7, 968         7, 554         8, 391         7, 704         8, 439         8, 202           Colorado         8, 235         8, 913         8, 552         9, 510         9, 752         9, 546         9, 848           New Moxido         6, 235         6, 731         7, 314         7, 762         7, 694         7, 177         7, 944           Arizona         9, 482         9, 734         9, 764         8, 003         9, 020         9, 333         10, 087           Utah         7, 840         8, 933         9, 245         10, 080         10, 226         11, 423         11, 548           Nevada         7, 737         10, 482         9, 739 <t< td=""><td>Oklahoma</td><td></td><td></td><td>11,841</td><td>11,001</td><td>10, 959</td><td>10, 698</td><td>10, 242</td></t<>	Oklahoma			11,841	11,001	10, 959	10, 698	10, 242
Montana         6,822         7,100         6,508         7,549         7,247         7,311         7,257           Idaho         8,378         9,840         10,087         11,218         10,886         9,986         10,086           Wyoming         7,269         7,998         7,554         8,391         7,704         8,439         8,205           Colorado         8,235         8,913         8,552         9,510         9,752         9,546         9,844           New Moxico         6,235         6,731         7,314         7,762         7,694         7,177         7,944           Arizona         9,482         9,734         9,745         10,080         10,226         11,433         10,087           Utah         7,849         3,983         9,245         10,080         10,226         11,432         11,342           Nevada         7,737         10,482         9,330         11,926         13,051         10,313         11,342           Washington         9,865         9,988         10,996         10,266         10,607         10,883         11,212           Oalifornia         8,925         9,500         9,884         9,507         8,293         8,795	Texas	7, 336	7, 940	9, 345	9, 611	9, 485	9, 196	9, 488
Idaho     8, 378     9, 840     10, 087     11, 218     10, 886     9, 986     10, 086       Wyoming     7, 260     7, 968     7, 554     8, 391     7, 704     8, 439     8, 202       Colorado     8, 225     8, 913     8, 552     0, 510     9, 752     9, 546     9, 846       New Moxico     6, 235     6, 731     7, 314     7, 762     7, 694     7, 177     7, 744       Arizona     9, 482     9, 734     9, 764     8, 003     9, 020     9, 333     10, 087       Utah     7, 849     8, 983     9, 245     10, 080     10, 226     11, 433     11, 546       Nevada     7, 737     10, 482     9, 339     11, 926     13, 051     10, 318     11, 342       Washington     9, 865     9, 988     10, 996     10, 266     10, 670     10, 883     11, 218       Oragon     9, 153     9, 059     10, 281     10, 522     10, 579     10, 005     10, 281       Galifornia     8, 925     0, 500     9, 884     9, 507     8, 293     8, 795     9, 900       Western     8, 481     0, 050     9, 362     9, 593     9, 335     9, 223     9, 814	South Central	6, 742	7, 388	8, 056	7, 529	7, 234	7, 203	7, 127
Idaho     8, 378     9, 840     10, 087     11, 218     10, 886     9, 986     10, 086       Wyoming     7, 260     7, 968     7, 554     8, 391     7, 704     8, 439     8, 202       Colorado     8, 225     8, 913     8, 552     0, 510     9, 752     9, 546     9, 846       New Moxico     6, 235     6, 731     7, 314     7, 762     7, 694     7, 177     7, 744       Arizona     9, 482     9, 734     9, 764     8, 003     9, 020     9, 333     10, 087       Utah     7, 849     8, 983     9, 245     10, 080     10, 226     11, 433     11, 546       Nevada     7, 737     10, 482     9, 339     11, 926     13, 051     10, 318     11, 342       Washington     9, 865     9, 988     10, 996     10, 266     10, 670     10, 883     11, 218       Oragon     9, 153     9, 059     10, 281     10, 522     10, 579     10, 005     10, 281       Galifornia     8, 925     0, 500     9, 884     9, 507     8, 293     8, 795     9, 900       Western     8, 481     0, 050     9, 362     9, 593     9, 335     9, 223     9, 814	Montana	6, 822	7, 190	6, 506	7, 549	7, 247	7, 311	7, 253
Wyoming         7, 260         7, 968         7, 554         8, 391         7, 764         8, 439         8, 200           Colorado         8, 235         8, 913         8, 552         0, 510         9, 752         0, 548         9, 844           New Morico         6, 235         6, 731         7, 314         7, 762         7, 694         7, 177         7, 944           Arizona         9, 482         9, 734         0, 764         8, 903         9, 020         9, 333         10, 087           Utah         7, 737         10, 482         9, 339         11, 926         13, 051         10, 318         11, 546           Nevada         7, 737         10, 482         9, 339         11, 926         13, 051         10, 318         11, 546           Washington         9, 865         9, 968         10, 996         10, 266         10, 607         10, 883         11, 218           Oregon         9, 153         9, 050         10, 281         10, 522         10, 579         10, 005         10, 281           Oalifornia         8, 925         0, 500         9, 884         9, 507         8, 293         8, 795         9, 906	Idaho.	8, 378	9, 840	10.087	11, 218	10, 886	9, 986	10, 050
New Mondo 6, 235 6, 731 7, 314 7, 762 7, 694 7, 177 7, 944 Arizona 9, 482 9, 734 9, 764 8, 903 9, 920 9, 333 10, 987 Utah 7, 840 8, 983 9, 245 10, 980 10, 226 11, 433 11, 546 Nevasia 7, 737 10, 482 9, 338 11, 926 13, 051 10, 318 11, 342 Washington 9, 865 9, 968 10, 996 10, 266 10, 607 10, 883 11, 342 Washington 9, 153 9, 059 10, 281 10, 522 10, 579 10, 005 10, 281 California 8, 925 0, 500 9, 834 9, 507 8, 293 8, 795 9, 996 Western 8, 481 9, 050 9, 362 9, 593 9, 335 9, 223 9, 814	Wyoming	7, 269	7, 968	7, 554	8, 391	7, 764	8, 439	8, 202
New Mondo 6, 235 6, 731 7, 314 7, 762 7, 694 7, 177 7, 944 Arizona 9, 482 9, 734 9, 764 8, 903 9, 920 9, 333 10, 987 Utah 7, 840 8, 983 9, 245 10, 980 10, 226 11, 433 11, 546 Nevasia 7, 737 10, 482 9, 338 11, 926 13, 051 10, 318 11, 342 Washington 9, 865 9, 968 10, 996 10, 266 10, 607 10, 883 11, 342 Washington 9, 153 9, 059 10, 281 10, 522 10, 579 10, 005 10, 281 California 8, 925 0, 500 9, 834 9, 507 8, 293 8, 795 9, 996 Western 8, 481 9, 050 9, 362 9, 593 9, 335 9, 223 9, 814	Colorado	8, 235	8, 913	8, 552	9, 510	9, 752	9, 546	9, 844
New Art   NewA	New Mexico	6, 235	B 791	7, 314	7, 762	7,694	7, 177	7, 944
Utah.     7, 349     8, 983     9, 245     10, 080     10, 226     11, 433     11, 546       Nevada.     7, 737     10, 482     9, 330     11, 926     18, 051     10, 318     11, 342       Washington     9, 865     9, 988     10, 996     10, 266     10, 607     10, 883     11, 216       Oregon     9, 153     9, 059     10, 281     10, 522     10, 579     10, 005     10, 281       California     8, 925     9, 500     9, 884     9, 507     8, 293     8, 795     9, 900       Western     8, 481     9, 050     9, 362     9, 593     9, 335     9, 223     9, 814	Arizona	9, 482	9, 734	9,704	8, 903	9, 020	9, 333	10, 087
Oreignin     9, 153     9, 609     10, 281     10, 522     10, 579     10, 005     10, 281       California     8, 925     9, 500     9, 834     9, 507     8, 293     8, 795     9, 900       Western     8, 481     9, 050     9, 362     9, 593     9, 335     9, 223     9, 814	Utah	7,840	8, 983	9, 245	10,080	10, 226	11, 433	11, 546
Oreign     9, 153     9, 609     10, 281     10, 522     10, 579     10, 005     10, 281       California     8, 925     9, 500     9, 834     9, 507     8, 293     8, 795     9, 906       Wostern     8, 481     9, 050     9, 362     9, 593     9, 335     9, 223     9, 814	Nevada	7,737	10, 482	9, 339	11, 926		10, 318	11, 342
Oreign     9, 153     9, 609     10, 281     10, 522     10, 579     10, 005     10, 281       California     8, 925     9, 500     9, 834     9, 507     8, 293     8, 795     9, 906       Wostern     8, 481     9, 050     9, 362     9, 593     9, 335     9, 223     9, 814	wasnington				10, 266	10, 607	10, 883	11, 218
Western 8, 481 9, 050 9, 362 9, 593 9, 335 9, 223 9, 811	Oregon			10, 281	10, 522			10, 281
	California	8, 925	9, 500	9, 834	9, 507	8, 293	8, 795	9, 999
United States	Wostern	8, 481	9, 050	9, 362	9, 593	9, 335	9, 223	9, 811
	United States	8, 859	9, 401	9, 827	9, 608	9, 440	9, 620	9, 655

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<sup>&</sup>lt;sup>1</sup> Calculated by multiplying average daily layings per flock by the number of days in the year. Daily production derived from number of eggs laid on the first day of each month, as reported for about 22,000 farm flocks.

Table 424.—Poultry, live: Freight receipts, by States, at New York, 1927-1931

State	1927	1928	1929	1930	1931	State	1927	1928	1929	1930	1931
Alabama Arkansas Oolorado Delaware Florida Georgia Illinois Indiana Iowa Kentucky Louisiana Maryland Massachusetts Michigan Minnesota Mississippi Missouri Nebraska	Cars 82 420 52  1,227 1,267 856 661 739 1 1 1 164 2,147 996	874 842 586 474 741 1 6 164 188 1,896	369 86  179 880 963 354 422 397  6 131 90 1,874	1, 168 604 509 511 2 123 76 2, 019	359 24 3 62 978 942 732 447 593 	New Jersey New Mexico New York North Carolina North Dakota Ohio Oklahoma Pennsylvania South Carolina South Dakota Tennessee Texas Utah Virginia Wisconsin Wyoming Other States United States	Cars  1 1 91 429 808 58 29 187 975 365	33 343 873 30 41 313 1,060 436 	335 835 44 125 273 884 348 4 56 175 13	107 55 305 763 12 49 214 642 332 91 188 4	8 59 300 857 233 96 192 1

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Table 425.—Poultry, dressed: Receipts, gross weight, 1 at four markets, by months, 1927-1931; totals, 1921-1931

Market and year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Boston: 1927 1928 1929 1930 1931 New	4,318 4,591 4,586 4,270 4,840	1,000 pounds 3, 610 3, 756 3, 231 3, 992 4, 565	2, 440 4, 137 2, 315 2, 815	1,000 pounds 2,398 2,877 2,855 2,544 2,976	1,000 pounds 3, 653 3, 285 2, 718 3, 193 2, 559	3,455 3,290 3,369 3,514	1,000 pounds 2,996 3,899 3,153 3,401 3,476	1,000 pounds 3, 612 3, 468 3, 628 2, 952 3, 635	3, 404 3, 555 4, 309 3, 154	1,000 pounds 4,663 4,680 5,048 3,875 4,434		10, 329 10, 395 9, 309	53,305 55,583 54,433 51,289
York: 1927 - 1928 - 1929 - 1930 - 1931 - Phil-	12, 954 14, 999 14, 221 15, 054 17, 969	8, 957 11, 064 10, 900 11, 674 13, 396	9,322 9,964 8,476	7, 770 9, 703 9, 520 10, 630 10, 073	11, 633 10, 628 10, 233 13, 877 10, 553	11,127 11,876 14,009	13, 252 13, 078	14, 589 13, 850 15, 707 12, 533 18, 204	14, 832 16, 558 15, 383	17, 682 21, 799 20, 602 19, 647 18, 749	31,740 31,846 31,495 32,584 33,029	32, 454 32, 903 34, 221	188, 117 194, 376 197, 057 200, 885 218, 911
adel- phia: 1927 1928 1929 1930 1931 Chica-	2,885 2,373 2,548 3,041 2,384	2, 006 1, 601 1, 851 2, 501 2, 179	2,005 1,885 1,680 2,207 2,863	1,769 1,359 1,471 1,991 1,754	1, 695 1, 558 1, 557 2, 888 1, 560	1,668 2,177 1,663 2,117 2,509	1, 398 1, 931 2, 134 1, 794 2, 720	1, 918 1, 763 2, 319 1, 772 2, 875	2,097 2,302 2,166	2, 613 2, 965 2, 542 3, 046 2, 524	4, 432 4, 925 6, 002 5, 607 6, 018	6, 903 7, 210 8, 505 7, 906 8, 243	31,844
go: 1927 1928 1929 1930 1931 Total:	6, 495 6, 639 7, 712 9, 835 7, 770	3, 546 3, 591 3, 469 5, 597 4, 529	2, 195 2, 216 2, 707 2, 899 8, 563	1,835 1,876 2,725 2,339 2,320	2, 872 2, 137 2, 811 2, 163 2, 309	2, 257 1, 077 3, 270 2, 645 2, 501	1, 227 2, 771 3, 520 2, 303 3, 130	2, 257 2, 829 3, 984 2, 777 3, 673	2, 531 3, 580 4, 710 3, 809 4, 642	3, 752 5, 719 9, 070 6, 274 4, 397	15, 739 15, 301 25, 578 19, 409 14, 203	18, 544 23, 812	63,735 67,180 93,368 80,153 71,475
1921 1922 1923 1924 1925 1926 1927 1928 1929 1930 1931 1931	22, 659 22, 250 43, 123 37, 150 27, 585 26, 122 26, 652 28, 602 29, 067 82, 200 32, 963	13, 634 14, 506 22, 858 26, 395 19, 383 18, 576 18, 119 20, 012 19, 451 23, 764 24, 669	10, 860 13, 320 16, 752 20, 344 15, 048 17, 344 15, 362 17, 560 16, 666 16, 897 20, 192	9, 837 11, 512 12, 436 15, 182 13, 323 18, 809 13, 772 15, 815 16, 571 17, 504 17, 123	10, 402 14, 373 13, 210 17, 319 16, 166 16, 371 19, 853 17, 608 17, 319 21, 621 16, 981	12, 325 16, 606 16, 205 17, 862 17, 487 21, 099 21, 015 18, 571 20, 178 23, 275 21, 883	10, 136 13, 703 16, 863 19, 572 17, 676 20, 724 17, 789 21, 853 21, 885 19, 305 24, 577	15, 463 15, 433 17, 794 17, 543 17, 466 22, 932 22, 376 21, 910 25, 638 20, 034 28, 477	17, 121 18, 399 19, 868 18, 683 24, 278 23, 935 23, 564	21, 645 21, 434 28, 087 26, 982 27, 259 30, 738 28, 710 35, 163 37, 262 32, 842 30, 104	47, 259 45, 540 56, 018 60, 445 61, 488 68, 594 60, 422 59, 788 71, 901 65, 870 62, 948	71, 957 73, 100 78, 068 66, 794 75, 228 68, 974 68, 537 75, 705 71, 539	252, 356 277, 755 334, 845 356, 730 318, 358 355, 815 336, 979 348, 983 379, 522 368, 863 386, 361

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<sup>&</sup>lt;sup>1</sup>Gross weight includes container and wrapping.

Table 426.—Poultry, dressed: Receipts, gross weight, at four markets, by State of origin, 1927-1931

Market and origin	1927	1928	1929	1930	1931	Market and origin	1927	1928	1929	1930	1931
BOSTQN	1,000 lbs.	1,000	1,000	1,000	1,000	CHICAGO	1,000	1,000 lbs.	1,000	1,000	1,000
III. Ind	lbs.	lbs.	1,000 lbs.	1,000 lbs.	Us.	CHICAGO Ark. Colo Calif. Colo Idaho III. Ind Lowa. Kans. Ky. Mich. Minn. Mo. Mont. Nebr. N. J. N. Mor. N. Y. N. Dak. Ohlo. Okla. S. Dak. Tenn. Tex. Wis. Wyo. Other States. Connada.	lbs.	lbs.	lbs.	<i>tos.</i>	lbs.
m	14, 203		10,651	10, 497	9, 284	Ark	238	688	193	216	381
ina	5, 225	5, 368	3, 200 7, 600	3,677	3, 298	Calit	99	28 293	234 378	78 546	138 433
Towa	9 509	6, 648 4, 557	4, 917	7, 495 2, 155	8,917 3,774	Tdobo	120	171	551	446	*55 84
Kv	453	204	141	365	227	Til Til	2 203	2, 581	3, 411	3, 521	3, 376
Me	690	509	500	479	319	Ind	536	559	778	801	217
Mass	495	85	27	37	5	Iowa.	14, 719	13, 117	18, 505	18, 152	13,694
Mich	681	888	663	515	424	Kans.	2,915	4, 315	5, 108 124	18, 152 4, 111	4,590 477
Minn	5, 886	6,860	6, 786	9,024 2,328	9, 502	Ky	208	32	124	113	477
Мо́	1,509	1,881	6, 786 2, 722	2,328	2, 100 3, 763	Mich	66	379	62	111	79
Nepr	1,930	3, 298	0,100	3,950	3, 763	Minn	10, 541	7,829	13, 933 6, 647	9,891	10,852
N. H	1 407	1,709	15 757	25	13	1VL0	1 000	6, 379	2, 904	5,985 1,898	4,603
N. Dor	1,407	478	1,473	1,008 1,521	942 2,678	Nobr	3 247	1, 530 4, 295	4, 169	3,875	1, 135 4, 273
Ohio	533	390	1, 140	l 84 i	254	NI	78	304	4, 169 271	0,0.0	194
Okla	2,066	2,662	1, 364	1, 215	1,369	N. Mox	38	96	145	226	164
Pa	260	104	1	21	200 1	N. Y.	715	661	837	455	266
8. Dak	46	114	559	377	1, 541 323	N. Dak	4,769	5, 933	8,502	7, 616	6,826
Tenn	160	330	510	173	323	Ohio	15	26	273	185	50
Tex	5, 110	5,034	6, 693	5,476	7,099	Okla	2,250	2,712	2, 830	1,880	2,607
V L	26	28	31 266	31	31	S. Dak	0,009	7,371 361	10, 366 483	9,010 381	9, 282 393
Wis.	553 814	932 1,761	2, 245	94 742	322 1,250	Tenn	2 577	3,302	6, 930	6, 268	4, 459
Other States. Canada	72	1, 101			1,250	Wie	3,082	3, 409	4, 811	3, 135	2,310
Oattaua	- 12				1.20	WVO	133	260	4,811 373	444	264
Total	53, 305	55, 583	54, 433	51, 289	57,782	Other States	132	494	650	779	329
						Canada		55			
NEW YORK	į .										
		١				Total	63, 735	67, 180	93, 368	80, 153	71,475
Ark	78	40	442	532	837	Date   Date					
Call	918	1, 117	1, 753 598	1,476 1,225	1,668 801	PHILADELPHIA				1	
Del	56	1, 180	31	29	110	Colo	108	107	350	16	283
ldaho	244	1,650	1,730	1, 122	1,612	Idaho	712	688	432	502	200
III	28, 356	24, 864	124, 393	28, 182	27,594	m	4, 232	1,940	1,531	2,807	3,627
Ind	11, 585	11, 624	11, 480	113, 637	9,671	Ind	4, 135	3, 263	2,917	1,562	1,401
Iowa	25, 226	26, 324	30, 819	30, 295	36, 614	Iowa	4, 179	4,962	5, 558	6,577	6, 333
Kans	20, 725	21,070	20, 448	18, 887	16,926	Kans	1,615	4, 901 542	3, 564 621	2, 248 756	2,496
Ky	4, 700	5, 234 346	3, 050 238	2, 329 283	2, 672	КУ	84	106	128	82	218 84
Moss	495	336	347	390	241 113	Mich	102	47	45	117	266
Mich	859	2, 561	1,962	1,435	2,374	Minn	4.475	3,062	4, 190	7,595	8,707
Minn	10, 820	13, 937	12, 914	21, 322	24,080	Mo	1,168	1,249	951	1 1. 222	1,570
Mo	19, 231	19,817	19, 305	16, 301	13, 974	Nebr	673	1,089	1,438	1, 288	2, 416
Mont	202	471	315	399	450	N. J	113	305	130	812	197
Nebr	7,041	9,057	8, 120	8,861	9,512	Idaho III. Ind Iowa. Kans. Ky. Md Minn Mo. Nobr. N. J. N. Dak Ohio. Okla. Pa 8. Dak Tex Va. Wis. Other Steles	709	683	740	882	310
N. J	1,022	649	211	178	297	N. Dak	800	620	1, 140 397	390	793 92
N. Der	1 00%	14, 167 1, 236	12, 489 1, 841	14, 415 2, 099	23, 858 2, 783	Ohlo	2 007	2.710	2,984	2,418	2,508
Ohio .	3 020	2,306	3, 399	2, 519	3, 154	Pn	824	2,710 245	190	7 60	14
Okla	7.314	5, 478	7.012	6,410	8, 503	S. Dak	132	150	497	922	574
Orog	148	649	7,012 760	338	8, 503 747	Tex	1,829	1,745	3,450	3,020	4,815
Pa	1,332	660	524	537	801	Va	1,458	1,097	1, 166	853	421
8. Dak	3,413	3, 595	4,692	5,007	6,625	W. Va	410	291	313	302	143
Tenn	4, 507	4,512	3, 384	2,390 15,301	3,800	Wis	541	570	374	191	125
Ark	. 13, 102	16, 181	4, 692 3, 384 18, 386 305	559	15, 612 472	Other States.	558	981	1,549	1, 274	600
Vo	2 240	2, 158	2,013	1,586	722	Total	31, 822	31,841	34, 064	36, 536	38, 193
Wash	218	7, 190	619	383	353	1	102,022	1.,022	2,	1 300	00, 200
Wis	1, 843	1,551	934	1,304	1.103			1		1	ł
W yo		499	372	449	510	1	1	İ	1	1	
Other States.	698		1,115	705	600		1	1	1		
Canada	47	47	20		42	H		1	1	1	1
		-	-			11	1	i	ı	1	1
Total	1.00 ***	4404 0-	NA MUNICIPAL	7 000 000	010 011	11	1	1	1	1	

Bureau of Agricultural Economics. Compiled from reports of bureau representatives in the various markets.

<sup>1</sup> Gross weight includes container and wrapping.

Table 427.—Frozen poultry: Cold-storage holdings, by months, United States, 1922-1931

Year	Jan. 1	Feb. 1	Mar. 1	Apr. 1	Мау 1	June 1	July 1	Aug. 1	Sept. 1	Oct. 1	Nov. 1	Dec. 1
1924 1925 1926 1927 1928 1929	100, 170 93, 434 133, 990 111, 501 144, 497 117, 490 109, 684	1,000 lbs. 103, 350 121, 632 99, 486 138, 189 108, 512 145,076 118, 154 102, 380 141, 552 101, 307	113, 503 93, 497 130, 513 95, 397 129, 510 103, 494 89, 088 133, 172	94, 872 76, 067 108, 608 73, 124 104, 697 83, 169 68, 728 105, 708	74, 562 52, 068 82, 732 52, 783 77, 282 56, 832 52, 901 77, 420	57, 274 39, 290 68, 126 42, 808 61, 525 43, 872 41, 643	49, 100 34, 886 58, 562 36, 730 50, 064 38, 230 42, 001 54, 253	41, 250 33, 604 53, 558 35, 793 42, 293 40, 395 40, 896	34, 131 33, 837 47, 946 38, 634 39, 711 40, 749 49, 010 42, 589	33, 142 40, 070 41, 345 44, 771 43, 201 43, 578 61, 976 46, 938	40, 363 55, 139 53, 787 64, 842 52, 315 58, 093 80, 873 59, 269	63, 274 87, 939 86, 733 106, 854 85, 030 79, 173 115, 876 82, 925

Bureau of Agricultural Economics. Compiled from reports made by cold-storage establishments.

Table 428.—Chickens: Estimated average price per pound received by producers, United States, 1910-1931

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	Мау 15	June 15	July 15	Aug. 15	Sept.	Oct. 15	Nov. 15	Dec.	Weighted average
1910	Cents 11.0 10.6 10.0 11.5 11.5 12.1 22.1 23.3 21.7 18.9 17.3 17.5 18.9 20.9 20.1 19.6	Cents 11. 4 10. 6 10. 4 11. 0 11. 0 11. 3 12. 1 15. 1 120. 3 21. 8 25. 7 22. 3 19. 0 18. 6 18. 2 19. 1 1 20. 1 22. 1	Cents 11.8 10.7 10.6 11.4 12.4 11.7 12.5 15.7 20.2 23.4 28.9 22.8 18.9 20.0 21.9 21.3 20.1	Cents 12, 2 10, 9 11, 7 13, 0 11, 7 13, 11, 7 25, 7 28, 4 22, 2 20, 0 19, 4 19, 4 21, 1 21, 8 20, 8 23, 8	Cents 12. 4 11. 0 11. 11. 9 12. 7 12. 0 6 17. 5 20. 6 7 28. 0 21. 8 20. 2 20. 1 20. 3 22. 0 7 21. 7 21. 5 21. 5	Cents 12, 4 11, 1 11, 0 12, 0 13, 1 12, 2 14, 0 17, 7 21, 3 26, 4 21, 5 20, 5 21, 6 23, 9 20, 2 21, 5 24, 6	Cents 12. 2 11. 2 11. 2 13. 0 13. 4 12. 2 14. 1 17. 4 23. 2 26. 8 4 21. 7 20. 6 20. 2 21. 6 19. 9 21. 9 23. 7	Cents 12 0 11. 2 11. 3 12. 8 13. 1 12. 2 14. 1 16. 7 23. 4 26. 6 21. 4 18. 9 20. 0 20. 8 22. 1 19. 7 21. 6 7 22. 7	Cents 11.8 11.0 11.4 12.7 12.8 12.0 14.2 18.4 23.6 25.0 26.9 20.2 18.6 19.7 10.8 20.4 19.4 21.4 19.4 22.3	Cents 11.4 10.6 11.4 13.0 11.8 14.4 18.5 22.2 23.3 24.6 19.1 18.1 19.0 20.8 19.7 22.5	Cents 11.0 10.0 11.4 11.1 11.5 17.0 22.9 18.6 17.7 18.5 19.2 20.0 19.4 21.3	Cents 10.6 9.7 10.8 11.2 13.0 11.2 12.4 22.0 20.0 17.2 16.6 17.9 19.8 19.2 21.2 11.2	Cents 11. 33 10. 4 10. 9 11. 7 11. 8 11. 6 13. 4 18. 9 21. 6 23. 4 24. 3 29. 1 18. 4 18. 8 18. 8 19. 9 21. 2 21. 2 21. 5
1930 1931	19. 8 15. 7	20. 4 15. 1	20. 6 16. 1	21. 1 16. 7	20. 0 15. 9	19. 0 16. 1	17. 4 15. 8	17. 3 16. 2	17. 8 15. 7	17.4	16.1	15.3	17. 6 15. 0

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by number 1919 census to obtain a price for the United States; yearly price obtained by weighting monthly prices by receipts of dressed poultry. Average price of chickens (live weight) of all ages as reported.

Table 429.—Turkeys, live: Estimated average price per pound received by producers, United States, 1913-1931

Season	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Season	Oct. 15	Nov. 15	Dec. 15	Jan. 15
1912	Cents 13. 6 14. 6 14. 1 13. 7 17. 0 20. 0 23. 9 26. 6 30. 0 25. 7	Cents 14.4 15.2 14.1 14.8 18.6 21.0 25.7 28.3 31.8 28.2	Cents 14.8 15.5 14.5 19.6 23.0 27.0 31.1 33.1	Cents 14.9 15.5 14.5 19.5 22.9 27.3 32.0 33.0	1022_ 1023_ 1924_ 1925_ 1928_ 1928_ 1929_ 1929_ 1930_ 1931_	Cents 25. 1 26. 6 23. 3 24. 0 26. 6 26. 4 27. 2 27. 2 21. 0 17. 9	Cents 29. 5 27. 9 24. 2 28. 3 29. 8 30. 8 31. 2 27. 1 20. 1 18. 3	Cents 32.3 24.5 25.8 31.1 32.8 32.3 30.5 23.5 19.9	Cents 29. 7 23. 1 26. 2 31. 7 81. 6 29. 8 28. 2 23. 7 21. 6 18. 0

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by number 1919 Census to obtain a price for the United States.

<sup>1</sup> Quantities given net weight.

Table 430.—Eggs: Receipts at six markets by State of origin, 1927-1931

Market and origin	1927	1928	1929	1930	1931	Market and origin	1927	1928	1929	1930	1931
BOSTON	1,000	1,000	1,000	1,000	1,000	NEW YORK-con.	1,000	1,000	1,000	1,000	1,000
****	cases	cases	cases	cases	cases		cases	cases	cases	cases	C0868
Illinois	319	251	195	161	191	Oregon	64	72	48	53	94
Indiana Iowa	211 307	152 194	133 245	117 272	101 323	Pennsylvania	212	191	189	214	166
Kansas	206	244	253	171	211	Tennessee Utah	195 114	186 217	113 215	87 396	36 554
Maine	76	84	70	64	45	Virginia	iii	102	89	79	- 39
Massachusetts	16	7	6	10	9	Washington	655	661	669	760	859
Michigan	41	36	36	35	47	Wisconsin	54	54	29	49	57
Minnesota	219	236	221	229	229	Other States	264	375	371	250	255
Missouri		106	107	64	80						
Nebraska	87	94	128	139	117	Total	7, 048	7, 288	7, 129	7, 595	7, 601
New Hampshire New York	25 41	31 32	24 31	28 27	24 25	PHILADELPHIA					
Ohio		53	52	14	55	PHILADELPAIA		1	1	l l	
Vermont	17	22	17	17	15	California	24	82	65	112	97
Other States	149	215	200	195	164	Delaware	16	49	51	44	24
						Illinois	110	124	113	124	187
Total	1,960	1, 757	1,718	1, 573	1,636	Indiana	129	60	56	44	35
						Iowa	127	128	126	125	154
CHICAGO	i					Kansas	60	91	71	78	101
California	70	67	=4		70	Maryland Michigan	35 95	38 61	43 57	55 47	33 69
Illinois	52 152	120	184	33 150	73 127	Minnesota	151	196	218	237	227
Iowa		826	804	977	959	Missouri	221	183	167	157	207
Kansas	477	446	315	232	295	Nebraska	30	29	34	39	37
Michigan	37	57	40	22	13	New York	6	24	41	22	20
Minnesota	583	545	688	772	778	Ohio	96	54	51	47	27
Missouri	832	674	5G6	542	555	Pennsylvania	97	273	274	287	177
Nebraska	420	438	429	309	340	Tennessee	59	22	15	25	9
North Dakota Oklahoma	27 82	38 96	45 68	40 35	51 34	Virginia Washington	129 28	125 59	108	86 72	37 76
South Dakota		467	445	508	459	West Virginia	13	8	5	4	3
Toxas	36	97	67	13	21	Wisconsin	46	38	52	65	67
Wisconsin	503	427	477	490	382	Other States		93	89	89	143
Other States	328	303	216	262	227						
						Total	1, 549	1, 735	1, 697	1, 759	1, 730
Total	4, 901	4, 601	4, 398	4, 475	4,314	BAN FRANCISCO	-				
NEW YORK											
						California	705	710	737	749	730
Qalifornia	502	589	581	698	589	Idaho	6	13	3	2	2
Delaware	87	72	39	39	28	Oregon	19	23	18	8	20 3
Idaho Illinois		34 869	771	70 829	204 704	Washington Other States	17	6 4	4	(¹) <sub>8</sub>	3
Indiana	200	468	437	454	387	Other States	3	**	*	0	- 0
Iowa	1.038	1.071	1, 254	1. 388	1,354	Total	750	756	766	765	758
Kansas		280	318	275	255						
Kentucky	97	63	23	31	24	LOS ANGELES	1				
Marvland	141	131	88	70	36						
Michigan	36	46	42	70	80	California	409	604	641	761	730
Minnesota	178	204	195	279	353	Idaho	22	10	31	22	6
Missouri	342 64	349 132	403 145	276 166	328 273	Oregon	19	7	18 20	5 52	14
Nebraska New Jersey	194	180	214	228	232	Utah Other States	19	8	25	5Z	14
New York	605	666	660	625	468	OULUL DUADES	-		20	- *	
Ohio	356	276	204	209	226	Total	460	633	735	844	767
	1		]			1	1	1		1	L
			-								

Bureau of Agricultural Economics. Compiled from reports of bureau representatives in the various markets. Reported in cases of 30 dozen.

<sup>1</sup> Not over 500 cases.

TABLE 431.—Eggs: Receipts at five markets, by months, specified years

Market and year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	1.000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Boston:	cases	cases	cases	cases	cases	cases	cases	cases	cases	cases	cases	CG868	cases
1928	102	145	229	211	258	200	158	112	96	96	78	72	1, 757
1929	133	99	190	290	234	177	176	125	110	77	54		1.718
1920	98	112	209	227	208	175	138	102	82	66	68	90	1,718 1,578
1931	126	153	198	207	219	188	125	108	95	77	62	78	1,630
New York:		-00											7,500
1928	412	613	931	1,052	1,089	767	591	494	407	392	268	272	7, 288
1929	394	371	821	1,061	999	837	668		444	380	203	335	7, 120
1930	461	811	938	1, 155	1,076	785	645		496	373	322	382	7, 608
1931	478	530	940	1, 155 1, 116	1,052	868	568		484	398	304	347	7, 601
Philadelphia:		•	٧	-,	2,002	~~	-	0.10	-0-	000	502	021	-, 002
1928	97	133	176	210	246	175	168	117	140	103	75	95	1, 735
1929	118	76	169	234	220	181	156		131	94	74	101	1, 697
1930	100	112	204	244	261	178	145		114	91	86	130	1,750
1931	133	148	189	205	184	186	141		124	92	97	99	1,730
Ohiooro.	100	140	100	200	104	100	727	102	12.2	-		00	1, 100
1928	200	366	592	813	849	562	356	284	241	150	75	113	4, 601
1929	206	222	554	924	799	554	342	301	210	135	62	89	4, 308
1930	202	308	641	927	747	516	381	231	211	131	69	111	
1931	231	367	634	867	709	559	290	238	191	96	61	71	4, 475
an Francisco:	201	907	004	904	108	009	200	200	191	إنع	01	1,1	4, 314
1928	52	63	106	75	61	59	61	69	54	52	49		
1920	67	63	82	86	80	65	67	55	49	49	49	55 54	750
1930	59	67	71	79	73	74	69	65	50	55	47		766
1931	58	66	85	83	72	61	56	59	49	50 50		56	768
Madala	00	90	00	00)	14	0.1	- 00	98	43	00	54	56	758
1919	494	7 014	1 850	9 741	9 494	1,890	1, 276	1, 018	826	001	2004	044	
1920	508	1, 014 815	1, 556 1, 447	7 701	0 000	1, 805	1, 143			691	394	341	14, 686
1921	653	1 161	7, 330	0 407	2, 400	1, 000	1, 140	911	806	594	398	382	12,940
1922	809	1, 161 1, 025	2, 209 1, 952	2, 407	2, 000	7,000	1, 142 1, 804	1, 107	900	727	488	<i>5</i> 31	15,010
1923	852	1,032	1, 802	2, 902	2,080	1,561 1,926 2,066	1,804	1, 019	816	704	484	492	16, 010
1924		1,002	2, 118	2, 200	2, 802	2,000	1,349	1, 180	988	844	555	587	16,691
1925	714 618	1,006 1,176	1, 654 1, 846	2, 009	2, 044	1, 871	1,431	1,042	876	748	457	524	15, 406
1926		7 110	1, 840	2,000	2, 193	2, 025	1,315	1, 106	930	709	433	626	15, 540
1927	908	1,070	1,741	2, 080	2, 201	2,010	1,886	1, 081	933	699	581	752	15, 511
1928	971	1,178	1,997	2, 780	2, 523	1, 767	1, 226	1,004	897	704	603	608	16, 208
1929	863	1, 320	2, 034	4, 501	4, 503	1, 763	1, 334	1,076	938	793	545	607	16, 137
1930	918 918	881	1, 816	2, 595	2, 332	1,814	1,409	1, 150	944	735	532	632	15, 708
1930		1, 110	2,063	2,761 1,934 2,467 2,902 2,268 2,539 2,563 2,086 2,730 2,595 2,595 2,478	424 203 255 255 255 251 251 251 251 251 251 251	1,871 2,025 2,015 1,767 1,763 1,814 1,728 1,862	1,378	943	953	716	592	769	16, 167
1691	1,026	1, 264	2,046	4, 478	2, 236	1,862	1, 180	1, 053	943	722	578	651	16, 039

Bureau of Agricultural Economics. Compiled from reports of bureau representatives in the various markets. Reported in cases of 30 dozen. See 1927 Yearbook, p. 1098, for data for earlier years.

Table 432.—Eggs, case and frozen: Cold-storage holdings, United States, 1922-1931

Kind and year	Jan. 1	Feb. 1	Mar, 1	Apr. 1	May 1	June 1	July 1	Aug. 1	Sept. 1	Oct. 1	Nov. 1	1)ec. 1
Case eggs: 1 1922 1923 1924 1924 1925 1926 1927 1928 1929 1930 1931	1,000 cases 889 1,311 1,027 1,050 1,683 1,096 882 1,415 704 1,894	26 248 139	13 44 21 77 92 66 11 84	1,087 559	1,000 cases 4,648 3,737 3,563 4,872 3,735 5,551 4,515 3,952 5,766 5,162	7, 890 6, 875 7, 712 7, 236 8, 962 8, 168 6, 705 9, 178	8, 685 9, 482 9, 133 10, 565 10, 002 8, 510 10, 743	10, 024 9, 845 10, 746 10, 496 8, 962 11, 198	9, 883 8, 778 9, 873 9, 573 9, 650 9, 944 8, 547 10, 375	8, 737 7, 400 8, 612 8, 048 7, 960 8, 542 7, 195 9, 174	6, 645 5, 267 6, 322 5, 888 5, 485 6, 247 4, 930 6, 785	3, 102 3, 786 3, 215 2, 956 3, 542 2, 631 4, 154
Prozen eggs: 2 1922 1923 1924 1924 1925 1929 1927 1927 1929 1930 1930	1,000 lbs. 19,260 22,787 32,087 21,303 33,905 33,593 47,020 56,181 53,644 83,184	29, 256 31, 207 38, 575 48, 055 44, 080	14,603 23,106 11,364 24,167 26,063 31,362 38,250 35,192	10, 311 20, 736 11, 353 21, 849 83, 272 84, 411 84, 918 49, 751	23, 707 19, 579 25, 739 52, 053 51, 532 51, 825 76, 664	20, 730 29, 956 29, 544 34, 815 71, 605 67, 941	29, 686 38, 565 38, 379 45, 688 81, 263 77, 744 84, 766 115, 134	36, 192 35, 184 42, 855 51, 810 81, 418 81, 670 91, 488 116, 272	87, 280 34, 128 47, 099 52, 634 77, 508 89, 196 86, 693 113, 138	43,836 81,006 44,299 51,062 71,208 82,255 81,541	40, 424 26, 633 45, 314 44, 966 62, 066 73, 327 70, 331	1,000 lbs. 26,233 36,004 22,100 39,336 38,620 54,703 64,201 61,772 89,571

Bureau of Agricultural Economics. Compiled from reports made by cold-storage establishments. 1 30-dozen cases.

<sup>2</sup> Quantities given are net weight.

Table 433.—Eggs and egg products: International trade, average 1925–1929, annual 1927–1930

## EGGS IN THE SHELL

		<u></u>	114 11	IE SH						
					Calenda	ar year				
Country	A ve 1925	rape -1929	19	1927		1928		9	1930 1	
	E <sub>7</sub> -	Im- ports	E <sub>λ</sub> - ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports
PRINCIPAL EXPORTING COUNTRIES	1,000 dozen	1,000 dozen	1,000 dozen	1,000 dozen	1,000 dozen	1,000 dozen	1,000 dozen	1,000 dozen	1,000 dozen	1,000 dozen
Netherlands Russia Poland	98, 429 86, 978 76, 215	8, 965 0 493	103, 614 102, 186 96, 400	. 0	111, 145 141, 429 80, 190 65, 750	. 0	78, 620	298	124, 860 14, 471 80, 999	1, 324 0 50 52
China	56, 278 47, 058	225 0 449 1,419	50, 235 49, 462	372	52, 059 50, 465	547	48, 109	0 275	71,852 51,360 47,355 42,934	106 1,726
Russia Poland Poland China Irish Free State Belgium Italy France United States Hungary Bulgaria Rumania Morocco Egypt Algeria Lithusnia Sweden Union of South Airica Estonia Norway	25, 943 24, 536	17, 969 11, 499	20, 700 15, 863	22, 379	17, 675 46, 584	26, 299 11, 723	15, 192	24, 071 21, 619	13, 701 30, 144 18, 579	33, 583
Hungary Bulgaria Rumania	18, 020 17, 258 15, 011	350 338 0	20, 933 18, 335	299	12, 999 15, 650 213, 328	410 0	10, 589 18, 697 216, 989	431	19, 367 28, 239 24, 725	204
Morocco Egypt Algeria	14, 985 10, 879 5, 830	1 0 6 17	11, 983 9, 197 4, 702	0 0 8 4	13, 207 10, 625 5, 762	0 14	18, 469 12, 461	0	14, 629 8, 202 4, 233	118
Lithuania Sweden Union of South Airlea	5, 313 4, 422 3, 477	679 113	5, 349 5, 486 3, 601	215 128	5, 388 5, 432 3, 929	334 146	4,626 7,419 4,546	351 48	4, 599 6, 543 6, 158	628
Finland	58	37	98 26	84 17	178 9	102 74	995 59	110 14	1,056 637	11. 21:
Total	644, 286	42, 675	670, 374	45, 147	730, 755	53, 032	656, 104	53, 975	616, 708	59, 35
PRINCIPAL IMPORTING COUNTRIES										
United Kingdom Germany SpainAustria	973 591	238, 350 220, 035 34, 479	965 286	243, 012 225, 119 35, 102	685	263, 740 245, 746 45, 585	253	247, 420 229, 412	150	264, 306 219, 906 39, 154
Austria	1,730 0	22, 033 20, 465	2,002	24, 786 21, 700 16, 159	1,727	25, 692	) C	44, 341 20, 884 10, 074 18, 004	4 C	25, 869 8, 16
Argentina Cuba Philippine Islands Ozechoslovakia	1,518 0	9,791 8,793 5,935	977 0	10, 976 11, 220 5, 728	1,073 0	11, 792 6, 392 6, 016	482	11, 388 2, 642 7, 237	1,424	14, 84 1, 31 6, 95
Ozechoslovakia Mexico British Malaya Canada	1,828 0 366	4, 917 4, 202 3, 638	3, 287 0 292	4, 287 5, 009 4, 357	1,999 0 340	7, 205 3, 903 3, 618	1,921 428	7, 114 2, 295 4, 606	2,628 0 270	4,36
Chile	1,365 8 22	2, 244 67		2 34	0	139	1	154	2 19	2 33°
Total	8, 421	592, 081	8, 281	610, 716	7, 972	657, 058	7, 589	606, 297	7,368	620, 62

## EGGS NOT IN THE SHELL

PRINCIPAL EXPORTING COUNTRY China	1,000 lhs. 128, 990	1,000 lbs. 0	1,000 lbs. 100, 856	1,000 lbs. 0	1,000 lbs. 120, 803	1,000 lbs. 0	1,000 lbs. 150, 923	1,000 lbs. 0	1,000 lbs. 153, 804	1,000 lba.
PRINCIPAL IMPORTING COUNTRIES										
United Kingdom United States Germany France Netherlands Canada Italy Belgium Irish Free State Sweden Ozechoslovakla	238 860 0 16 216	24, 914 18, 252 7, 375 4, 355 1, 700 1, 317 1, 137 1, 031	1, 544 175 862 0 27 85 37 0 22	15, 341 17, 836 4, 978 3, 970 2, 025 953 1, 110 1, 090 673 812	508 2, 385 99 1, 064 0 28 194 13 1 9	3, 030 1, 376 1, 169 883 828 901 715	326 2, 413 516 791 0 6 589 4 2 7	26, 030 25, 544 11, 919 5, 485 560 1, 647 1, 628 1, 067 1, 232 1, 233 1, 682	196 2, 065 303 1, 009 0 12 486 2 0 19 7	15, 504 5, 588 1, 758 1, 854 1, 643 1, 126 1, 074 1, 596 1, 290
Denmark Union of South Africa Norway	16 0	512 54 11	i 5	461 40 6		293 24 10	0	458 14 19	31	
Total	4, 558	128, 778	3,890	119, 703	4, 954	130, 445	5,044	153, 010	4, 293	161, 258

Burean of Agriculture Economics. Official sources except where otherwise noted. In countries reporting in units of weight, the conversion factor used is 1½ pounds equals 1 dozen.

<sup>1</sup> Preliminary.

<sup>&</sup>lt;sup>2</sup> International Yearbook of Agricultural Statistics.

<sup>3 4-</sup> year average.

TABLE 434.—Eggs: Average price per dozen at five markets, by months, specified years

Market, grade, and year	Jan,	Feb.	Mar.	Apr.	Мау	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver- age
New York:													
Fresh firsts-	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
1910	38 28	27	23	22 17	21 17	20 15	18	21 18	24	26	31	34	25
1911		19	17	17	17	15	17	18	21	24	32	35	22
1912 1913	84	36 22 29 26 26 26	22	20	19 20	19	20 19	21	24	26	31	29	25 22 25 25 27 26 30 40 49 53 36 40 36 32 22 22 22 22 22 22 22 22 22 22 22 22
1913 1914	24	22	19	19	20	19	18	23 24	27	29	39	36	25
1914	33 38	29	26	20	20	21	21 20	22	26 26	27 30	35 35	38	27
1916	31	20	20	21 22 34	20	20 23 83	20 25	22	33	34	41	34	20
1917	46	45	22 31	24	35	20	34	20 38	41	41	49	46 57	30
1918	65	58	31	24	85	36	41	43	47	53	05	67	40
1919	62	44	38 44	43	46	44	46	48	51	62	60	70	102
1920	71	59	48	44	44	42	47	51	57	64	77	79 78	57
1921	67	42	81	27	25	43 27	33	35	30	49	58	54	41
1922	4i	38	25	28	27	25	24	26	39	43	53	53	25
1923	42	87	81	27	27	24	25	29	35	39	53	47	35
1924	42	39	25	35 43 44 27 28 27 24 29 32 28 28 27	25	27	29 33	26 29 33 33	39	44	52	57	36
1925	59	44	25 30	29	25 82	27 33	33	33	37	43	56	51	40
1926	38	31	29	82	21	30	29 25	31	38	40	50	48	36
1927	42	32	25	28	23 30 31	23 29	25	28	34	40	44	45	32
1928	45	32	29	28	30	29	80	31	83	82	37	87	33
1929	36	41	29 25 29 33 26 22	28	31	31	32	34	36	40	48	51	37
1930 1931	42	35	28	27	23	24	22	25 22	25	26	31	29	28
	24	20	222	20	19	19	20	22	24	24	28	27	22
Chicago:		Ì									1		
Fresh firsts— 1927	38	27			-	~							
1928	43	20	24	43	22 28 30	22	23 28	26	33	37	42	43	30 32
1929	36	38	20	20	20	28	31	30 33	32 37	34 42	41 47	39	32
1930	40	34	24 27 29 24	23 27 20 24	21	28 29 22	21	25	26	28	47	48	35
1931	21	16	19	17	17	16	18	19	20	24	33 29	28 24	35 27 20
Boston:	~-	10	14		71	10	10	19	20	24	20	24	20
Western firsts—													
1927	41	31	26	25	24	23	25	28	34	89	44	44	99
1028	46	35	29	20	30	30	30	32	34	36	44	43	98
1929	38	43	26 29 32	28	31	31	32	35	37	40	49	52	37
1930	44	37	26 21	25 29 28 26 20	24	24	22	25	25	26	34	28	30
1931	25	18	21	20	18	17	19	20	21	25	30	27	32 35 37 39 22
Philadelphia:		l									"		
Extra firsts—													
1927	43	33	27	26 30	26	25	28 33	33	40	48	55	50	86
1928	50	37	30	30	82	32	33	36	39	42	50	45	36 38 41 33 25
1929 1930	41	45	35	29	33	34	36 28	30	44	49	56	58 32	41
1930	46 28	40 20	28 22	29 28 21	26	27	28	32	33	36	44	32	33
San Francisco:	28	20	22	21	19	21	24	24	26	29	34	31	25
Fresh extras—													
1927	33	25	99	24	24	24		90	0.0		ا بد		
1928	33	24	23 25		26	29	26	32 33	39	47	44	38	32 33 36
1929	81	26	25	98	31	32 32	30 37	41	39	44	45	38	33
1930	36	26 28	25 28	90	27	26	20	31	44 37	52 40	49	44	36
1931	22	19	20	25 26 28 20	20	20	26 22	26	31	38	41 33	27	31 25
					~~		44	441	1 10	00	00 1	231	7.5

Bureau of Agricultural Economics. Prices 1910-1922 are averages of daily prices in New York Journal of Commerce. Subsequently monthly prices from the Bureau of Labor Statistics, except San Francisco, which is from the Pacific Dairy Review. Earlier data are available in 1925 Yearbook, p. 1224, Table 636, and 1927 Yearbook, p. 1105.

Table 435.—Eggs: Estimated average price per dozen received by producers, United States, 1910–1931

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	Мау 15	June 15	July 15	Aug. 15	Sept.	Oct. 15	Nov. 15	Dec. 15	Weighted average
1910	Cents 29, 7 26, 2 29, 3 24, 8 29, 8 31, 7 28, 8 1 48, 9 55, 3 60, 9 54, 5 4 48, 6 36, 3 36, 9	Cents 25. 9 19. 3 26. 8 21. 1 25. 3 23. 7 24. 2 35. 7 45. 8 34. 8 48. 5 31. 0 4 29. 9 33. 6 35. 7 28. 9 29. 0	Cents 20. 8 15. 7 21. 2 17. 9 22. 2 16. 5 18. 2 25. 3 30. 9 33. 9 40. 5 26. 4 20. 4 23. 9 24. 1 20. 8	Cents 18. 6 14. 8 17. 4 15. 9 16. 4 16. 6 17. 7 28. 5 30. 4 36. 0 20. 5 20. 0 21. 6 19. 1 24. 2 24. 8 20. 3	Cents 18. 4 14. 6 16. 9 16. 1 16. 5 18. 5 30. 2 30. 6 38. 9 37. 5 19. 4 20. 9 21. 8 19. 8 24. 8 25. 2 19. 8	Cents 18, 2 14, 4 16, 7 16, 8 17, 2 16, 1 18, 9 29, 5 36, 1 35, 9 20, 1 20, 2 20, 9 21, 1 26, 1 7 17, 8	Cents 17. 9 14. 8 17. 0 16. 4 17. 5 16. 3 19. 9 37. 9 37. 8 24. 3 20. 3 21. 3 22. 8 27. 9 25. 7	Cents 18. 5 16. 4 18. 2 17. 7 19. 1 17. 3 21. 6 30. 5 35. 2 40. 6 42. 5 28. 9 20. 6 23. 6 26. 1 30. 0 26. 4 23. 4	Cents 20. 9 18. 7 20. 6 21. 3 22. 5 20. 6 25. 3 35. 8 39. 1 43. 1 48. 6 30. 9 27. 3 29. 8 31. 8 31. 1 31. 5 29. 4	Cents 23. 8 24. 0 26. 0 23. 7 24. 6 30. 4 5 44. 9 51. 0 54. 6 38. 2 37. 7 36. 8 35. 6	Cents 27. 2 26. 1 8 31. 3 28. 2 29. 4 34. 9 41. 2 51. 7 59. 1 62. 9 50. 0 43. 6 45. 8 44. 9 41. 6	Cents 29. 7 29. 1 28. 2 32. 9 31. 9 31. 1 38. 3 45. 9 6 67. 1 51. 1 47. 2 45. 5 49. 9 48. 1 47. 6 43. 3	Cents 20. 5 16. 9 18. 8 20. 1 18. 8 20. 1 31. 3 35. 2 39. 9 42. 3 26. 9 25. 6 25. 2 29. 1 27. 9 23. 8
1928 1929 1930 1931	38. 2 33. 0 38. 4 22. 1	29. 1 31. 9 31. 8 14. 1	23.4 28.0 21.3 17.0	22. 8 23. 0 21. 5 16. 2	24. 2 24. 4 20. 0 13. 3	23.9 26.1 18.6 14.1	25. 6 27. 2 18. 8 14. 8	27. 4 29. 8 20. 6 17. 3	31. 4 33. 9 25. 3 19. 1	34. 9 38. 4 26. 5 22. 7	39. 6 44. 2 31. 7 26. 4	42.9 45.8 26.8 25.6	26. 8 28. 6 22. 7 16. 6

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices by States, weighted by production 1919 census to obtain a price for the United States. Yearly price obtained by weighting monthly prices by receipts monthly.

# STATISTICS OF FOREIGN TRADE IN AGRICULTURAL PRODUCTS

Table No. 436.—Summary of exports and imports, United States, 1908-9 to 1930-31

		Agricult	ural ex	ports 1		Agricul impor	tural ts <sup>1</sup>	Mr. cose of		Forest 1	products	š
Year begin-	Total exports	Dome	stic		Total		Per-	Excess of agricul- tural	Eap	orts		
ning July—	exj,orus	Value	Per- cent- age of total	Reex- ports	imports	Value	cent- age of total	exports	Do- mestic	Reex- ports	lm- ports	Excess of im- ports
1908-10. 1910-11. 1911-12. 1912-13. 1913-14. 1914-15. 1916-17. 1917-18. 1018-19. 1919-20. 1920-21. 1921-22. 1922-23. 1923-24. 1924-25. 1924-25. 1925-27. 1927-28. 1927-28.	1,000 dollars 1,638,356 1,710,084 2,170,320 2,170,320 2,248,508 2,329,684 2,716,178 4,272,178 6,227,164 6,327,164 6,385,584 6,385,584 6,385,584 4,773,132 4,778,155 4,773,332 5,283,988 4,177,348 4,773,748 4,773,748 4,	871, 168 1, 030, 73 1, 1050, 622 1, 123, 665 1, 123, 665 1, 138, 677 1, 475, 938 1, 168, 265 2, 280, 466 3, 579, 918 3, 861, 511 2, 607, 641 1, 907, 846 1, 191, 867, 039 1, 897, 998 1, 897, 998 1, 897, 998 1, 897, 998 1, 897, 998 1, 1847, 210 1, 1495, 907	50. 9 51. 4 48. 4 47. 3 54. 3 51. 6 40. 8 51. 8 51. 8 51. 3 51. 6 51. 6	22, 162 20, 573 17, 171 19, 652 20, 286 38, 222 20, 286 38, 222 44, 210 105, 587 128, 191 90, 739 43, 589 62, 719 64, 168 75, 162 72, 222 73, 391 63, 942	1,000 dollars 1,311,920 1,556,947 1,557,226 1,653,235 1,674,170 2,197,848 2,650,355 2,945,653 3,095,720 5,238,362 4,680,079 3,554,037 3,	794, 370 773, 116, 634 1, 000, 409 997, 911 1, 349, 563 1, 599, 600 1, 326, 436 1, 390, 237 1, 371, 720 2, 077, 240 1, 875, 365 2, 528, 775 2, 281, 421 2, 193, 868 2, 170, 046 1, 390, 508	51. 0 50. 6 53. 8 59. 6 61. 4 62. 0 62. 3 65. 1 52. 6 54. 9 53. 8 56. 7 53. 7 53. 7 54. 9	98, 9505 179, 303 226, 670 133, 851 516, 249 212, 525 414, 013 498, 240 1, 755, 477 579, 084 638, 1-13 577, 755 229, 679 54, 452 287, 388 2 502, 874 2 502, 874 3 301, 338 2 301, 328 2 301, 338 3 301, 338 3 301, 338 3 301, 338 3 301, 338 3 301, 338 3 301, 338	85, 030 103, 039 108, 122 124, 836 106, 979 52, 554 68, 155 68, 919 87, 181 113, 275 69, 115 129, 981 162, 374 162, 731 171, 970 174, 509	2,110 1,679 1,961 1,961 1,287 1,435 1,435 1,435 1,533 2,315 1,533 1,250 1,363 1,352 1,353	60, 753 75, 010 71, 736 69, 581 82, 878 81, 162 79, 451	24, 675 57, 269 89, 900 15, 555 33, 602 79, 243 70, 413 102, 662 52, 775 69, 916 74, 364 64, 912 39, 747 42, 000 46, 293

Bureau of Agricultural Economics. This table supersedes Table No. 500 in the Yearbook of Agriculture, 1931, the value of total imports and exports has been given and the imports of "rubber, unmanufactured, and similar gums" have been deducted from the "imports of forest products" and added to "imports of agricultural products," also reexports of "rubber, unmanufactured, and similar gums" have been deducted from "reexports of forest products" and added to "reexports of agricultural products." "Rubber, unmanufactured, and similar gums," includes: Balata, guayule, gutta-joolatong or jelutong or pontianak, gutta-percha, India rubber orude, and India rubber scrap or refuse, fit only for remanufacture.

Table 437 .- Agricultural products: Value of trade between continental United States and noncontiguous Territories, 1921-22 to 1930-31

	Porto	Rico	Ца	 waii	Ala	ska
Year beginning July—	United States ship- ments to	Ship- ments to United States	United States ship- ments to	Ship- ments to United States	United States ship- ments to	Ship- ments to United States
1921-22. 1922-23. 1923-24. 1924-25. 1924-25. 1926-27. 1927-28. 1929-30. 1929-30. 1939-31 1.	1,000 dollars 21, 926 24, 080 28, 819 29, 710 32, 212 32, 603 28, 146 31, 466 28, 117 25, 061	1,000 dollars 53, 892 61, 801 66, 581 70, 190 70, 385 84, 061 82, 326 53, 333 75, 868 75, 320	1,000 dollars 12,734 15,096 17,539 17,954 17,806 18,019 19,004 19,348 10,883 17,759	1,000 dollars 66, 292 93, 313 104, 267 97, 430 105, 470 98, 600 110, 338 103, 653 98, 097 102, 932	1,000 dollars 7, 123 8, 207 9, 016 9, 774 9, 539 8, 737 9, 435 9, 108 9, 257 6, 980	1,000 dollars 13 190 865 415 516 720 231 290 511

Bureau of Agricultural Economics. Compiled from Monthly Summary of Foreign Commerce of the United States, June issues, 1923-1931.

Does not include forest products, but includes rubber now mostly a plantation product.

Excess of agricultural imports.
 Excess of exports.

<sup>&</sup>lt;sup>1</sup> Preliminary.

Table 438.—Agricultural products: Value of principal groups exported from and imported into the United States, 1928-29 to 1930-31

		Ä	ear beginn	ing July-		
Article .	Doz	nestic exp	orts	Ger	eral impo	rts
	1928-29	1929-30	1930-31 1	1928-29	1929-30	1930–311
ANIMALS AND ANIMAL PRODUCTS	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars
Animals, live	6, 058 17, 668 5, 145 9, 112 187, 878	5, 307 16, 575 4, 470 5, 896 181, 585	2, 955 12, 248 3, 472 4, 208 117, 194	29, 634 37, 764 8, 130 131, 780 30, 654 393, 648	21, 148 31, 907 8, 851 129, 890 23, 754 360, 682	5, 312 16, 942 2, 890 60, 734 6, 893 227, 323
Silk, unmanufactured	107 13, 658	103 11, 184	55 7, 467	86, 521 40, 862	59, 414 40, 686	24, 338 27, 647
Total animals and animal products	239, 621	225, 120	147, 599	758, 993	676, 332	372, 129
VEGETABLE PRODUCTS						
Chocolate and cocoa Coffee Cotton lint, unmanufactured Linters	2,627 861,090 7,120	2,746 667,243 3,959	2, 790 422, 104 2, 453	45, 771 308, 268 56, 437	40, 755 256, 541 42, 078	28, 029 192, 820 5, 328
Total cotton, unmanufactured	868, 219	671, 202	424, 557	56, 437	42, 078	5, 328
Fruits and grain products. Orlans and grain products. Oilseeds and oilseed products. Rubbor and similar gums Seeds, accept oilseeds.	1,528	110, 431 248, 268 1, 398 32, 875	120, 585 146, 580 1, 169 15, 605	56, 392 37, 026 31, 208 188, 383 235, 075 9, 343	60, 889 24, 280 24, 765 167, 286 195, 080 7, 819	47, 309 26, 265 17, 738 101, 086 96, 113 5, 315
Spices Sugar, molasses, and sirups	9, 951	344	178	18, 811 227, 825 26, 968	18, 435 176, 565 21, 321	11, 162 126, 527 21, 904
Tobacco, unmanufactured Vegetables and preparations Vegetable products, miscellaneous	148, 077 23, 333 24, 623	148, 452 23, 638 20, 573	142, 283 15, 403 13, 578	55, 803 39, 880 82, 386	47, 550 49, 823 77, 383	37, 601 28, 298 45, 345
Total vegetable products	1,607,595	1, 270, 787	890, 441	1, 419, 575	1, 214, 176	790, 930
Total animal and vegetable products.	1, 847, 216	1, 495, 907	1, 038, 040	2, 178, 568	1, 890, 508	1, 163, 059
FOREST PRODUCTS						
Dyeing and tanning materials	28, 701 138, 635	2, 258 28, 511 122, 648 8, 326	1, 621 17, 635 72, 777 5, 671	8, 019 35, 969 86, 210 92, 051	8, 065 29, 134 79, 019 93, 170	5, 524 15, 505 51, 728 69, 832
Total forest products.			97, 701		209, 418	142, 589
Total agricultural products						
	1	1			1	1

Bureau of Agricultural Economics. Compiled from Monthly Summary of Foreign Commerce of the United States, June issues, 1929 and 1931. In the statistics of foreign commerce of the United States, the Phillippine Islands are treated as a foreign country. The statistics of foreign commerce include the trade of the customs districts of Alaska, Hawali, and Porto Rico with foreign countries, but do not include the trade of these Territories with the United States.

Preliminary.

Table 439.—Index numbers of United States agricultural exports, 1909-10 to 1930-31

## [Base 1910-1914=100]

Year beginning July—	All com- modities	All com- modities except cotton	Cotton fibor	Grains and products	Cattle and meat products	Dairy products	Fruits	Tobacco
1909-10. 1910-11. 1911-12. 1912-13. 1912-13. 1914-15. 1914-16. 1916-17. 1917-18. 1918-19. 1919-20. 1920-21. 1921-22. 1921-23. 1923-24. 1923-24. 1924-25. 1925-26. 1926-27. 1927-28. 1928-20. 1928-20. 1928-20. 1928-30.	110 106 138 118 118 101 145 134 127	86 92 100 110 103 189 184 182 165 207 212 218 183 163 163 143 143 144 117 101	73 91 125 103 103 99 70 70 53 80 64 76 95 93 131 131 99 99 82	82 85 78 143 112 301 237 217 117 179 272 218 329 317 246 246 143 225 117 188 188 188 188 174	91 104 115 92 126 164 164 197 287 185 154 153 169 140 140 114 98 98 98 102 101	58 03 126 120 103 302 479 716 975 1, 287 1, 275 571 406 451 392 283 263 243 243 243 2190	76 80 101 136 98 119 109 101 63 111 122 108 105 121 214 124 134 372 236	91 90 97 107 114 80 113 105 74 160 165 129 118 116 152 110 137 132 125 144 153

Bureau of Agricultural Economics. Computations are based on the gross exports of 44 of the most important farm products. The index numbers were calculated as follows: Quantities of various commodities exported each year were multiplied by the average yearly export prices of these commodities from July, 1909, to June, 1914. The sum of the values determined in this way was then divided by the average yearly value of exports from 1909-10 to 1913-14 to obtain the index.

TABLE 440.—Exports and imports of selected forest products, 1909-10 to 1930-31

		Don	estic exp	orts		Imports				
	Lun	aber					Lun	iber		
Year beginning July—	Boards, deals, and planks	Staves	Rosin	Spirits of tur- pen- tine	Tim- ber, hewn and sawed	Cam- phor, crude	Boards, deals, planks and other sawed	Shin- gles	1,000 pounds 15,495 16,495 16,495 24,153 25,818 32,540 22,913 14,263 32,540 22,913 14,263 32,540 32,773 32,540	Wood pulp
1900-10 1910-11 1911-12 1912-13 1912-13 1913-14 1914-16 1916-17 1914-18 1918-19 1917-18 1918-19 1919-20 1920-21 1921-22 1921-22 1922-23 1923-24 1924-25 1924-25 1925-26 1926-27 1927-28 1928-29 1928-29 1928-29 1928-29 1928-29 1928-30 1930-31	2,357 2,405 1,129 1,177 1,068 1,078 1,543 1,543 1,543 1,543 2,186 2,387 2,387	77hou-sands 49, 784 65, 726 64, 103 89, 006 77, 106 77, 106 77, 107 77, 107 39, 297 63, 297 63, 297 65, 710 35, 162 65, 710 35, 162 67, 68 67, 68 68, 409 78, 624 47, 207	1,000 barrels 2,144 2,100 2,474 2,806 2,418 1,372 1,639 1,071 882 1,322 882 1,205 1,412 1,073 1,205 1,412 1,073 1,209 1,309 1,309 1,309 1,309 1,104	1,000 gallons 16,588 14,818 19,599 21,094 18,901 9,464 5,065 7,481 10,786 9,742 10,786 11,194 11,194 12,308 10,254 13,820 14,175 15,722 11,175 11,175 11,175	1,000 M feet 401 532 438 512 441 174 201 184 106 92 234 1123 268 383 815 586 652 707 7825 711 657 406	1,000 pounds 3,007 3,726 2,155 3,709 3,727 4,574 4,574 4,026 2,623 4,026 2,175 2,612 1,904 2,175 2,612 1,755 2,612 1,755 2,614 1,777 1,746	1,000 M feet 1,064 872 905 1,091 929 929 1,238 1,175 1,297 1,492 1,178 1,786 1,786 1,782 1,869 1,841 1,541 1,441 1,461 916	1,000 A1 703 643 515 560 895 1,487 1,769 1,873 1,783 1,783 2,152 2,152 2,482 2,254 2,254 2,254 1,357 2,152 2	29, 402 15, 495 18, 746	1,000 long to ns 377 402 477: 502 506 588 507 690 477 722 622 902 1, 188 1, 464 1, 504 1, 641 1, 641 1, 441

Bureau of Agricultural Economics. Compiled from Foreign Commerce and Navigation of the United States, 1909–1918, and Monthly Summary of Foreign Commerce of the United States, June issues, 1920–1931.

<sup>1</sup> Preliminary.

Table 441.—Exports of selected domestic agricultural products, averages 1899–1900 to 1908–9, annual 1909–10 to 1930–31

Year beginning July—	Butter	Choese	Milk, con- densed and evapo- rated	Eggs in the shell	I THO DIE	od-	Pork fresh		ed C	acon, lud- lng um- rland ides	Hams and shoul- ders, in cluding Wilt- shire sides	Lard
Average: 1899-1900 to 1903-4 1904-5 to 1908-9	,	31, 552	1,000 pounds (²) (²)	1,000 dozen 3,12 5,43	5 1,305	ds 217	1,000 poun 28, 0 13, 1	ds pour 90 119,	ds po 050 3	,000 unds 61, 686 271, 929	1,000 pounds 209, 954 208, 230	1,000 pounds 576, 414 622, 299
1909-10 1910-11 1911-12 1911-12 1912-13 1913-14 1914-15 1916-16 1916-17 1918-19 1918-19 1919-20 1920-21 1921-22 1922-23 1922-24 1922-23 1922-24 1922-23 1922-24 1922-23 1922-24 1922-23 1922-24 1922-23 1922-23	9, 851 13, 487 26, 835 17, 736 33, 740 27, 156 7, 829 7, 512 9, 410 5, 425 8, 384	6, 333 2, 429 2, 428 55, 368 44, 394 44, 303 18, 792 19, 378 10, 826 7, 447 8, 443 4, 074 3, 938 4, 094 3, 773 2, 873 2, 873 2, 873 2, 339	259, 141 528, 751 728, 741 708, 463 262, 668 277, 311 157, 038 213, 614 173, 584	30 20, 400 30 20, 78 31 20, 78 32 26, 39 33 26, 39 34, 92 33, 76 33, 76 34, 28 34, 28 37, 96 37, 96	879,681	913 180 697 948 124 694 611 162 320 880 189 149 685 668 306	1, 0 1, 3 2, 5 2, 4 2, 9 63, 0 21, 3 11, 3 127, 2 257, 2 257, 2 257, 2 257, 2 11, 8 11, 0 11, 0 11, 0 11, 0 11, 0 11, 0 11, 0	555 45,583 56,583 68 45,685 68	043 461 993 2222 504 1,2 643 2286 4489 4489 4489 650 9962 9908	52, 163 56, 675 508, 574 200, 994 93, 964 446, 718 579, 809 667, 152 \$115, 294 338, 247 303, 667 \$189, 298 \$150, 549 108, 334 \$23, 500 \$26, 263 \$86, 153 \$27, 576 \$26, 977 \$29, 248 \$32, 267 \$52, 412	146, 885 57, 709 204, 044 156, 545 166, 882 203, 701 282, 209 7419, 572 667, 240 275, 456 172, 012 271, 429 381, 564 292, 214 4220, 014 143, 649 127, 819 99, 749	362, 928 476, 108 532, 256 519, 025 481, 458 476, 532 427, 011 484, 774, 717 587, 225 774, 717 512, 379 952, 642 1,014,898 792, 735 6675, 812 716, 394 787, 180 588, 670
Year beginning July—	Beef and its prod- ucts, total	Oleo oil	Cot- ton lint s	Lint-	Cotton- seed cake and meal	Li sce cal an me	ke id	Prunes	Rai- sins	Ap- ples iresi	Or- anges	Sugar, raw and refined <sup>8</sup>
A verage: 1899-1900 to 1903-4 1904-5 to 1908-9	1,000 pounds 636, 969 599, 332	199 550	6, 669 _ 8, 303 _		1,600 pounds 074,720 173,349		00 nds 190 , 450	1,000 pounds 39,767 35,003	1,000 pound 3, 31 6, 8	4 1.1	ls boxes	1,000 sh. tons 6 16
1900-10. 1910-11. 1911-12. 1912-13. 1913-14. 1914-16. 1916-17. 1917-18. 1918-19. 1919-20. 1920-21. 1921-22. 1922-23. 1924-26. 1928-27. 1927-28. 1928-29. 1929-30. 1930-31. 3	286, 206 265, 924 213, 925 170, 228 161, 212 394, 981 457, 556 423, 674 600, 132 591, 302 368, 032 591, 302 194, 912 185, 372 190, 211 162, 532 101, 303 102, 080 98, 379	126, 092 138, 697 128, 467 92, 870 97, 017 80, 482 102, 646 67, 110 56, 603 58, 202 74, 529 106, 549 104, 946 122, 965 126, 145 90, 410 92, 720 04, 851 61, 088 54, 961	6, 413 - 8, 008 - 11, 070 - 9, 125 - 9, 522 - 8, 581 - 5, 702 4, 455 - 5, 442 - 5, 570 - 6, 592 - 6, 592 - 5, 784 - 8, 239 - 8, 110 - 11, 281 - 7, 890 - 8, 520	226 1, 251 1,	640, 089 801, 597 203, 690 128, 690 1728, 690 057, 222 150, 160 44, 681 311, 624 449, 573 454, 701 532, 721 454, 350 250, 360 684, 523 671, 200 338, 240 87, 300	524 640 536 151 202 336 891 484 574 560 691 589 625 606 645	317 , 675 , 115 , 120 , 560 , 916 , 984 , 400 , 788 , 388 , 264 , 059 , 612 , 114 , 126 , 166 , 121 , 304 , 120 , 640	89, 015 51, 031 74, 328 117, 951 69, 814 43, 479 57, 423 59, 645 32, 927 114, 068 57, 401 100, 398 79, 229 136, 448 171, 771 151, 405 176, 544 280, 625 273, 051 142, 989 296, 254	54, 98 84, 11 86, 88 21, 49 49, 69 88, 91 135, 02 152, 33 193, 00 221, 70 128, 60	1,7415347,650607702601104155388077129922233773,73,73,73,73,73,73,73,73,73,73,73,7	561 1, 197 562 1, 063 577 1, 559 582 1, 759 661 1, 575 400 1, 850 385 1, 246 1, 402 561 1, 619 566 1, 799 568 2, 207 772 2, 227 772 2, 227 789 88 3, 340 44 2, 988 44 4, 222 26 3, 674	28 40 20 26 275 815 025 288 288 288 292 292 1,001 375 135 251 300 114 106 128 79

Footnotes at end of table.

Table 441.—Exports of selected domestic agricultural products, averages 1899-1900 to 1908-09, annual 1909-10 to 1930-31-Continued

Year beginning July—	Barley, includ- ing flour and malt <sup>7</sup>	Corn, includ- ing corn meal	Oats, includ- ing oat- meal	Rice, includ- ing flour, meal, and broken rice	Rye, includ- ing flour	Wheat, includ- ing flour	To- bacco, un- manu- fac- tured <sup>8</sup>	Glu- cose and grape sugar	Hops	Starch, includ- ing corn- starch
Average: 1899-1900 to 1903-4 1904-5 to 1908-9-	1,000 bushels 11, 931 9, 907	1,000 bushels 111,484 77,857	1,000 bushels 22, 188 13, 614	1,000 pounds 3,511 17,009	1,000 bushels 2,731 1,186	196, 690	321, 197		1,000 pounds 11, 420 15, 613	1,000 pounds 68, 173 52, 143
1909-10. 1910-11. 1911-12. 1912-13. 1912-13. 1913-14. 1914-15. 1915-16. 1916-17. 1917-18. 1918-19. 1919-20. 1920-21. 1920-21. 1922-23. 1922-24. 1924-25. 1926-26. 1926-27. 1927-28. 1928-29. 1929-30.	4, 454 9, 507 1, 655 17, 874 6, 945 28, 712 30, 821 20, 319 28, 717 20, 997 34, 555 27, 255 27, 255 27, 253 21, 900 13, 913 28, 548 49, 19, 655 24, 054 11, 443	10, 726 50, 668 39, 897 66, 753 49, 073 23, 019 70, 906 179, 490 96, 596 23, 135 9, 791 24, 783 19, 819 19, 876	8, 796 16, 777 89, 687 15, 041 9, 823	18, 223 75, 449 120, 695 181, 372 196, 363 193, 128 483, 363 440, 855 541, 509 370, 670 227, 757 112, 037 48, 175 804, 358 309, 788	40 31 1, 855 2, 273 13, 027 15, 250 17, 186 36, 467 41, 531 29, 944 51, 663 19, 902 12, 647 21, 667	81, 801 147, 955 335, 702 ,246, 221 205, 962 132, 579 287, 402 222, 030 330, 313 282, 566 224, 900 159, 880 200, 803 108, 035 219, 100	449, 750 348, 346 443, 293 411, 599 289, 171 629, 288 648, 038 506, 526 463, 389 454, 364 597, 630 430, 702 537, 240 510, 401 489, 996 565, 925	158, 463 186, 406 214, 973 97, 858 136, 230 245, 264 141, 954 273, 982 162, 693 148, 051 139, 577 170, 142 148, 789 145, 951 123, 366 101, 816	24, 263 16, 210 22, 410 4, 825 3, 495 7, 467 30, 780 22, 206 19, 522 13, 497 20, 461 16, 122 14, 998 13, 309 11, 812 8, 836 6, 703	707, 7137 210, 185 146, 424 73, 883 143, 788 237, 600 135, 365 386, 873 280, 790 202, 842 214, 247 224, 569 233, 111 241, 388 255, 660 203, 343
Year beginning July—	Corn- starch		Apri- cots, dried	Apri- cots, canned <sup>10</sup>	i	Peaches, canned 10	CHUITOUT		Pears, fresh 10	Grape- fruit, fresh
1912-13	38, 659 106, 727 163, 316 110, 514 254, 964 254, 96 208, 463 209, 865 208, 463 212, 277 275, 921 231, 657 200, 558 102, 886	1,000 pounds 41, 575 33, 566 42, 589 16, 219 10, 388 2, 603 11, 819 12, 431 12, 431 12, 431 12, 431 12, 431 12, 433 32, 670 21, 704 50, 024 23, 769 38, 121	11, 193 38, 777 13, 292 18, 132 17, 901 23, 684 24, 652	11 13, 809 26, 576 31, 360 29, 547 35, 896 29, 013 26, 249 33, 235	49, 358 38, 431 53, 851 75, 876 66, 104 52, 671 82, 652 54, 709	54, 624 50, 374 57, 390 83, 160 81, 896 86, 634 101, 438 74, 470	21, 848 25, 238 26, 252 37, 543 37, 426 51, 227 47, 533 46, 309	14, 022 20, 257 20, 302 24, 268 30, 791 38, 819 55, 638 46, 158	36, 785 50, 237 41, 452 71, 205 73, 877 51, 056 82, 847 62, 024	427 379 613 719 940 854

Bureau of Agricultural Economics. Compiled from Foreign Commerce and Navigation of the United States, 1900–1918, and Monthly Summary of Foreign Commerce of the United States, June issues 1921–1931. Conversion factors used: Corn meal, 1 barrel-4 bushels corn; catmeal, 18 pounds=1 bushel outs; rye flour, 1 barrel-6 bushels rye; malt, 1.1 bushels=1 bushel barley; wheat flour, 1 barrel=1900–1908, 4.75 bushels grain; 1909–1917, 4.7 bushels; 1918 and 1919, 4.5 bushels; 1920, 4.6 bushels; 1921–1931, 4.7 bushels. Applies, 3 boxes=1 barrel.

Includes canned, fresh, salted, or pickled pork, lard, neutral lard, lard oil, bacon, and hams.

Reported in value only.

Reported in value only.

Preliminary.

Includes canned, cured, and fresh beef, oleo oil, oleo stock, oleomargarine, tallow, and stearin from

nimal fats.

8 Bales of 500 pounds gross; lint cotton and linters not separately reported prior to 1915.

6 Includes maple sugar, 1919–1921.

7 Includes barley flour 1919–1922. Barley flour not separately reported prior to 1919 nor since 1922.

8 Includes "Stems, trimmings, and scrap tobucco."

9 Included with "Starch" prior to 1918.

10 Given in value only prior to 1923.

11 Jan. 1 to June 30.

Table 442.—Imports of selected agricultural products, averages 1899-1900 to 1908-09, annual 1909-10 to 1930-31

Year beginn July—	ing	Butte	r Cheese	Beef and veal, fresh	Cattle hides	Goat- skins	Total hides and skins (except furs)	Silk 1	Cotton, unman- ufac- tured	Wool, unman- ufac- tured, includ- ing mo- hair, etc.	Total, tobac- co, un- manu- fac- tured
Average: 1899-1900 1903-4 1904-5	to	1,000 pound 192	17, 846	1,000 pounds (2)	1,000 pounds 131,736	1,000 pounds 83, 047	1,000 pounds 309, 360	1,000 pounds 13,942	1,000 pounds 67, 292	1,000 pounds 155, 394	1,000 pounds 28, 216
1908-9_	i-	532	30, 462	(3)	138, 922	95, 555	372, 292	20,061	78, 771	209, 413	38, 688
1909-10 1910-11 1911-12 1912-13 1913-14 1914-15 1915-16 1916-17 1917-18 1918-19 1919-20 1920-21 1021-22 1922-23 1923-24 1924-25 1925-26 1926-27 1927-28 1928-29 1928-30 1930-31		1, 300 1, 008 1, 026 1, 163 7, 184 3, 822 7, 180 4, 131 20, 771 34, 344 9, 55; 77; 20, 44( 10, 7, 188 6, 44( 10, 7, 188 4, 9, 188 6, 4, 188 10, 7, 188 10, 7, 188 11, 208 2, 85; 1, 328	8 45, 569 46, 542 8 49, 388 2 63, 784 8 30, 088 4 14, 482 9, 839 1 2, 442 1 17, 914 4 16, 585 6 66, 597 2 64, 555 6 66, 597 9 61, 489 9 62, 412 8 9, 782 6 575, 424	(2) (3) (4) (5) 184, 491 71, 102 25, 452 36, 670 42, 436 41, 956 28, 001 32, 481 12, 419 18, 279 22, 098 47, 650 62, 481 30, 190 3, 551	318, 004 150, 128 251, 012 268, 042 279, 963 384, 341 434, 178 386, 600 253, 877 439, 461 198, 573 204, 936 405, 383 176, 475 199, 310 155, 587 150, 933 307, 362 216, 348 294, 832 91, 107	115, 845 86, 914 95, 341 99, 250 84, 759 100, 657 100, 657 100, 667 100, 667 100, 677 100, 640 66, 933 89, 905 128, 996 128, 996 128, 996 155, 881 65, 881 65, 881 65, 881 83, 571 84, 786 94, 488 83, 571 84, 786 84, 786 94, 488 83, 571 84, 786 94, 488 83, 571 84, 786 84, 786 84, 786 84, 786 84, 786 84, 883 85, 883	608, 619 374, 891 587, 768 577, 197 561, 071 563, 218 743, 670 700, 207 448, 142 708, 569 382, 193 382, 904 682, 893 385, 194 387, 447 384, 447 384, 548, 567 205, 936	23, 457 26, 686 26, 585 22, 101 34, 546 31, 1053 31, 1053 31, 925 40, 351 43, 881 50, 069 58, 410 63, 417 63, 487 65, 595 70, 270 87, 123 87, 123 87, 126 87, 408 87, 861	86, 038 113, 768 109, 780 121, 852 123, 347 185, 205 232, 801 147, 062 103, 356 103, 592 345, 314 125, 939 179, 165 236, 092 146, 024 190, 963 176, 450 227, 454 197, 657 51, 192	203, 928 137, 648 133, 401 1195, 293 247, 649 308, 083 534, 828 372, 372 379, 130 422, 415 427, 578 525, 473 525, 473 525, 473 527, 128 248, 035 270, 937 220, 476 149, 557	46, 853 49, 203 54, 740 67, 977 61, 175 45, 8078 49, 105 86, 991 83, 951 94, 05 75, 786 54, 497 76, 870 65, 225 76, 870 65, 235 76, 870 65, 24, 497 76, 870 65, 181 76, 426
Year begin- ning July—	sim	ms,	Coffee	Теа	Cocoa or cacao beans	Bana- nas	Olives	Lemons	Onions	Toma- toes, fresh	Beans, dry
Average: 1899 - 1900 to 1903-4 1904-5 to	pou	000 inds 973	1,000 pounds 928, 799	1,000 pounds 94, 342	1,000 pounds 54,936	1,000 bunches (4)	1,000 gallons (i)	1,000 boxes 2, 153	1,000 bushels 843	1,000 pounds (4)	1,000 bushels 1,002
1908-9	95,	054	965, 058	98, 353	91,774	§ 36, 988	\$ 2,796	2, 025	941	(4)	1, 270
1909-10. 1910-11. 1911-12. 1912-13. 1913-14. 1914-15. 1915-16. 1916-17. 1917-18. 1918-19. 1919-20. 1921-22. 1922-23. 1922-24. 1924-25. 1925-26. 1926-27. 1927-28. 1928-29. 1928-30. 1930-31.	101, 196, 304, 364, 414, 422, 660, 871, 578, 810, 633, 824, 962, 959,	122 183 914 984 215 610 300 512 489 434 659 272 245 3.130	871, 470 875, 367 885, 201 883, 131 1, 001, 528 1, 1, 118, 691 1, 131, 891 1, 143, 891 1, 143, 891 1, 144, 223 1, 238, 012 1, 238, 012 1, 238, 012 1, 429, 670 1, 473, 844 1, 473, 844 1, 473, 844 1, 473, 844 1, 473, 844 1, 473, 844 1, 473, 845 1, 473, 845 1, 473, 845 1, 473, 845 1, 473, 845 1, 473, 845 1, 473, 865 1, 473, 866	85, 026 102, 504 101, 407 94, 813 91, 131 90, 988 109, 806 103, 304 151, 315 97, 296 86, 142 96, 669 105, 443 92, 779 99, 411 97, 402 90, 099 92, 635 86, 388 87, 148	108, 608 138, 088 145, 960 140, 039 176, 268 192, 307 243, 232 338, 664 399, 040 313, 037 420, 331 337, 123 317, 124 381, 508 417, 660 417, 640 411, 543 411, 543 411, 543 411, 938 415, 442	44, 521 42, 357 48, 084 41, 092 36, 755 34, 651 34, 550 35, 382 40, 808 40, 120 44, 935 50, 513 58, 550 63, 599 63, 599 65, 590	4, 555 3, 045 5, 077 7, 3, 946 6, 3, 622 6, 938 5, 642 2, 385 3, 501 5, 206 4, 055 6, 848 5, 901 5, 902 6, 212 6, 458 6, 452 7, 429	2, 165 1, 824 1, 908 (4) (4) (4) (4) (4) (4) (4) (4) (4) (4)	1, 024 1, 515 1, 436 1, 115 829 816 1, 758 1, 115 1, 513 1, 513 1, 406 2, 488 1, 783 2, 488 1, 783 2, 498 1, 399 2, 1399 2, 918 214	(*) (*) (*) (*) (*) (*) (*) (*) (*) (*)	1, 015 1, 037 1, 048 1, 634 906 663 3, 748 4, 146 4, 016 3, 806 5, 623 886 1, 421 1, 051 2, 653 2, 534 1, 346

Footnotes at end of table.

Table 442.—Imports of selected agricultural products, averages 1899-1900 to 1908-9, annual 1909-10 to 1930-31—Continued

Year beginning July—	Al mor in term of shell	ids nu i ns ter	ea- its n ms if led s	Wal- nuts in terms of shelled s	Coco- nut meat	1 5	lax- eed	Sug ra an refi	w	Mo- lasses	Jute and jute butts, un- man- ufac- tured	Manila or abaca	Sisal and hene- quen
Average: 1899-1900 t 1903-4 1904-5 to 1908-	7,8	nds   pou	oy ja	1,000 pounds 18,017 26,849	1,000 pound ( <sup>10</sup> ) 15,010	s bu	,000 shels 504 218	1,0 8h to: 1, 1,	ort ns ( 894	1,000 jallons 13, 788 20, 221	1,000 long tons 102 114	1,000 long tons 54 58	1,000 long tons 87 98
1908-10. 1910-11. 1911-12. 1911-12. 1912-13. 1913-14. 1914-15. 1916-17. 1917-18. 1918-19. 1919-20. 1920-21. 1920-22. 1922-23. 1923-24. 1924-25. 1924-25. 1925-26. 1926-27. 1927-28. 1928-29. 1928-29. 1928-29. 1928-29. 1928-29. 1928-29. 1928-29. 1928-29. 1928-29. 1928-20. 1930-31 <sup>3</sup> .	10, 17, 18, 15, 15, 13, 14, 14, 14, 120, 225, 225, 224, 224, 224, 15, 18, 18, 19, 19, 19, 19, 19, 19, 19, 19, 19, 19	523 18, 2231 11, 556 14, 10, 27 38, 579 19, 5446 25, 5446 25, 5446 25, 5446 26, 5446 26, 5446 20, 5446 63, 66, 63, 66, 30, 95, 56, 30, 95, 56, 30, 95, 56, 30, 95, 56, 30, 95, 56, 30, 95, 56, 30, 95, 56, 30, 95, 56, 30, 95, 56, 31, 11, 11, 11, 11, 11, 11, 11, 11, 11	720 338 407 385 463 425 390 202 678 013 683 191 026 792 783	15, 902 35, 174 25, 970 28, 428 36, 623 31, 698 31, 776 20, 347 24, 500 20, 228 17, 818	21, 300 37, 817 69, 912 40, 877 55, 731 96, 481 118, 611 256, 801 256, 801 258, 221 213, 13- 2294, 10- 338, 597 344, 921 371, 96 444, 921 507, 13- 518, 17- 507, 13- 518, 17- 507, 13- 518, 17- 518, 17- 518, 17- 518, 17- 518, 17- 518, 17- 518, 17- 518, 17- 518, 18- 518, 18-	7 100 6 6 8 8 100 6 100	,002 ,499 ,842 ,294 ,653 ,666 ,679 ,397 ,302 ,170 ,632 ,577 ,419 ,524 ,112 ,494 ,652 ,813	ને જે જે જે જે જે જે જે જે જે જે જે જે જે	969 052 370 370 817 666 1 452 1 918 1 798 1 506 1 337 2 32 420 2 420 2 420 2 641 2 641 2 4 4 4 4 4 4 4 4 4 4 4 4 4	31, 292 23, 838 28, 828 33, 927 51, 410 70, 840 85, 717 10, 238 30, 731 30, 075 54, 670 13, 414 87, 908 61, 135 56, 246 600, 259 48, 427 96, 550	68 65 101 125 108 83 108 113 78 53 77 90 62 85 84 71 89 81 92 92	93 74 69 74 50 51 79 77 86 68 98 98 98 98 98 98 98 98 98 98 93 62 44 48 61 61 48 61 61 61 61 61 61 61 61 61 61 61 61 61	100 118 114 154 219 186 229 143 150 150 159 97 72 72 29 98 97 146 126 116 1124 133 143 144
Year beginning July—	Milk and ream, fresh	Cream, fresh	Eggs who in th shel	le, dri	egg ks, W ed, e en, d	hole ggs, ried	Who egg froz	S,	Yolks dried	Yolks frozes		frozen, pre- pared	Hair of the Angora (mo- hair)
1912-13 1913-14 1914-16 1915-16 1916-17 1917-18 1918-19 1919-20 1920-21 1921-22 1922-23 1922-23 1923-24 1924-25 1925-26 1926-27 1927-28 1928-29 1928-30 1930-31	5, 016	1,000 gallons 1,247 1,773 1,944 712 (3) (3) (2) (2) (2) (2) 71,646 4,765 4,765 4,765 4,765 4,193 4,819 3,474 844	27 29 28 28 28 33	70 pour 15 pou	nds pc 228 420 572 022 318 598 091 768 540 821 1 1 1 2		71,1 8,7 12,6 8,1 12,6 9,8	06 751 347 14 311		7 1, 21 5, 66 4, 60 1, 22 4, 58 8, 47	(2) (3) (3) (4) (5) (7) (8) (9) (9) (9) (9) (9) (9) (9) (9) (9) (9	7 636 1, 106 5, 119 3, 967 553 610 9, 955	1,000 pounds 

Bureau of Agricultural Economics. Compiled from Commerce and Navigation of the United States 1900-1918, and Monthly Summary of Foreign Commerce, June issue, 1919-1931.

<sup>1900-1918,</sup> and Monthly Summary of Foreign Commerce, June 1850e, 1818-1851.

1 Includes "Silk, raw or as reeled from cocoon," "Silk waste," and "Silk cocoons."

2 Not separately classified.

3 Preliminary.

4 Reported in value only.

52-year average.

63-year average.

7 Beginning Jan. 1, 1924.

8 Conversion factors used: Almonds, 30 per cent unshelled equals shelled. Peanuts, 3 pounds unshelled equals pounds shelled. Peanuts, 3 pounds unshelled equals shelled.

9 Includes broken, or shredded, desiccated or prepared and copra.

9 Included with "All other nuts."

11 Beginning Sept. 22, 1922.

Table 443.—Destination of principal agricultural products exported from the United States, 1927-28 to 1930-31

				beginnir	o Tuly			
Article and country to which exported		Quar				Per cen	t of tota	ıl
Gapureou	1027-28	1928-29	1929-30	1930-311	1927-28	1928-29	1929-30	1930-311
ANIMALS AND ANIMAL PRODUCTS	1,000	1,000	1,000	1,000	Per	Per	Per	
Butter:  Mexico	pounds 724 479 479 391 358 390 311 190	pounds 672 370 479 394 451 485 227 152	pounds 617 96 458 380 371 492 342 210	2001nds 426 6 394 261 67 351 157 154	cent 18. 3 12. 1 12. 1 9. 9 9. 0 9. 8 7. 8 4. 8	cent 18.0 9.8 12.7 10.4 11.9 12.8 6.0 4.0	cent 17. 2 2. 7 12 8 10. 6 10. 4 13. 7 9. 5 5. 9	Per cent 18.4 .3 17.0 11.3 2.9 15.2 6.8 6.6
Other countries	3, 965	548 3,778	616 3, 582	2,316	16. 2	14.4	17. 2	21. 5
Total	· · · · · · · · ·				' <del></del>		1	
Merico	581 432 293 359 331 259 145 473	423 460 294 405 360 170 89 371	506 485 289 170 252 176 45 416	293 442 233 72 207 179 29 278	20. 2 15. 0 10. 2 12. 5 11. 5 9. 0 5. 0 16. 6	16.4 17.9 11.4 15.7 14.0 6.6 3.5 14.5	21. 6 20. 7 12. 4 7. 3 10. 8 7. 5 1. 9 17. 8	16. 9 25. 5 13. 4 4. 2 11. 9 10. 3 1. 7 26. 1
Total	2,873	2, 572	2, 339	1,733	100.0	100.0	100.0	100.0
Milk: Condensed— Total Europe Cuba Philippine Islands Japan Hong Kong China Mexico Other countries	151 11, 462 7, 575 5, 385 3, 764 2, 513 985 5, 140	70 13, 103 7, 339 5, 473 3, 739 2, 840 883 6, 118	21 13, 196 7, 347 4, 701 3, 905 2, 173 1, 055 5, 373	14 3, 651 7, 566 4, 167 2, 372 1, 319 605 3, 240	31. 0 20. 5 14. 6 10. 2 6. 8 2. 7 13. 8	2 33. 1 18. 5 13. 8 9. 5 7. 2 2. 2 15. 5	34.9 19.5 12.4 10.3 5.8 2.8 14.2	. 1 15. 9 33. 0 18. 2 10. 3 5. 8 2. 6 14. 1
Total		39, 565	37, 771	22, 934	100.0	100.0	100.0	100.0
Evaporated— United Kingdom Balgium Germany Other Europe	23, 805 389 16 191	21, 759 265 71 172	11,877 25 11 421	15, 978 11 69 287	33, 1 .5 0 .3	1 :1	0	0
Total Europe Philippine Islands Panama Peru China British Malaya Cuba Japan Mexico Other countries	24, 401 15, 563 3, 589 3, 569 3, 035 2, 817 2, 647 2, 466 2, 157 11, 724	22, 267 16, 372 4, 606 4, 027 3, 447 2, 761 2, 272 2, 544 2, 185 12, 413	12, 334 17, 153 4, 805 3, 602 2, 056 3, 359 2, 935 2, 785 2, 274 12, 498	16, 345 18, 684 2, 898 1, 583 816 1, 026 486 2, 867 1, 296 10, 051	21. 6 5. 0 5. 0 4. 2 3. 9 3. 7 3. 4 8. 0	22. 5 6. 3 5. 5 4. 7 3. 8 3. 1 3. 5	5. 6 3. 2 5. 3 4. 6 4. 4	33. 3 5. 2 2. 8 1. 5 1. 8 . 9 5, 1 2. 3
Total		72,894	63, 801	56, 052	100.0	100.0	100.0	100,0
Bacon, including Cumberland sides: United Kingdom Germany Italy Finland Norway Netherlands Other Europe	50, 127 9, 838 8, 113 6, 075 3, 244 632 21, 525	15, 106 4, 633 2, 742 1, 198	2 642	26, 203 1, 151 764 1, 549 715 61 4, 975	7. 6. 4 4. 8 2. 6	11.7 3.6 2.	6. 4 6. 2 3 2. 8 1 2. 0	2. 2 1. 5 3. 0 1. 4 . 1 9. 4
Total Europe CubaCannda Other countries	99, 554	103, 235 16, 698 5, 769 3, 546	106, 389 17, 253 5, 617	35, 413 12, 398	78. 4 15. 4 2.	12.9	80. 0 13. 0 4. 2 7 2. 8	23.7
Total		-				100.	0 100.	100.0

<sup>&</sup>lt;sup>1</sup> Preliminary.

<sup>\*</sup> Excludes Bermuda.

Table 443.—Destination of principal agricultural products exported from the United States, 1927-28 to 1930-31—Continued

			Year	beginnin	g July			
Article and country to which exported		Quar	nt lit y			Per cen	t of tota	al
	1927-28	1928-29	1929-30	1930-31	1927-25	1928-29	1929-30	1930-31
ANIMALS AND ANIMAL PRODUCTS— continued								
Hams and shoulders, including Wiltshire sides: United Kingdom Belgium Other Europe	1,000 pounds 104,020 660 1,846	1,000 pounds 100, 959 1, 003 2, 024	1,000 pounds 103, 169 2, 136 1, 155	1,000 pounds 81, 294 1, 464 236	Per cent 81.4	Per cent 80.5 .8 1.6	Per cent 79. 2 1. 6 . 9	Per cent 81. 5 1. 5 . 2
Total EuropeCubaCanadaCother countries	106, 526 8, 167 6, 134 6, 992	103, 986 7, 435 6, 309 7, 666	106, 460 5, 053 11, 370 7, 435	82, 994 4, 272 5, 895 6, 588	83. 3 6. 4 4. 8 5. 5	82. 9 5. 9 5. 0 6. 2	81, 7 3, 9 8, 7 5, 7	83. 2 4. 3 5. 9 6. 6
Total	127, 819	125, 306	130, 318	99,749	100. 0	100.0	100.0	100.0
Pork: Cannod— United Kingdom Other Europe	7, 632 97	<b>6,</b> 555 145	10, 737 238	9, 066 193	88. 6 1. 1	82, 2 1, 8	84. 0 1. 9	85. 9 1. 8
Total EuropeOther countries	7, 729 885	6, 700 1, 274	10, 975 1, 808	9, 250 1, 293	89. 7 10. 3	84. 0 16. 0	85. 9 14. 1	87. 7 12. 3
Total	8, 614	7, 974	12, 783	10, 552	100.0	100. 0	100.0	100.0
Fresh— United Kingdom Other Europe	6,418 1,002	4, 547 2, 515	10, 527 3, 685	8, 008 464	58. 0 9. 1	42, 7 23, 7	56. 1 19. 6	73. 0 4. 2
Total Europe Cuba Canada Other countries	7, 420 1, 557 798 1, 284	7, 062 1, 732 582 1, 265	14, 212 1, 618 1, 091 1, 847	8, 562 424 410 1, 697	67. 1 14. 1 7. 2 11. 6	66. 4 16. 3 5. 5 11. 8	75, 7 8, 6 5, 8 9, 9	77. 2 3. 5 3. 7 15. 3
Total	11,059	10, 641	18, 768	11, 093	100.0	100. 0	100.0	100.0
Pickled— United Kingdom Norway Germany Other Europe	5, 184 722 250 821	7, 608 854 366 1, 420	5, 094 799 328 1, 194	2, 945 364 89 327	16. 4 2. 3 . 9 2. 6	19. 1 2. 1 . 9 3. 6	12.8 2.0 .8 3.0	13.9 1.7 .4 1.6
Total Europe	7, 056 8, 734	10, 248 10, 550 8, 596 4, 530	7, 415 9, 774 11, 211 4, 792	3, 725 4, 862 4, 356 3, 681	22. 2 21. 1 22. 3 11. 8	25. 7 26. 4 21. 5 11. 4	18. 6 24. 6 28. 2 12. 0	17. 6 23. 0 20. 6 17. 4
mudas	2, 851 1, 055 2, 312	2, 810 838 2, 334	221 719 5, 677	2, 226 544 1, 724	9. 0 3. 3 7. 3	7.0 2.1 5.9	.6 1.8 14.2	10.5 2.6 8.3
Total	31,650	39,906	39, 800	21, 118	100. 0	100, 0	100.0	100.0
Lard: United Kingdom Germany Netherlands Italy Belgium Other Europe	233, 564 176, 771 35, 784 20, 384 14, 541 38, 144	229, 899 195, 695 36, 992 29, 200 14, 841 49, 070	240, 147 180, 074 48, 584 19, 805 18, 700 56, 631	250, 353 107, 317 26, 478 6, 064 9, 406 14, 791	32.6 24.7 5.0 2.8 2.0 5.4	29. 4 25. 1 4. 7 3. 7 1. 9 0. 4	30. 5 22. 9 6. 2 2. 5 2. 4 7. 1	43.8 18.3 4.5 1.0 1.6 2.6
Total EuropeOther countries		585, 607 84, 316 140, 901	563, 401 79, 860 143, 899	420, 409 49, 004 116, 257	72. 5 11. 0 16. 5	71. 2 10. 8 18. 0	71. 6 10. 1 18. 3	71.8 8.4 10.8
Total	716, 398	780, 914	787, 160	585, 670	100. 0	100.0	100.0	100.0

Table 443.—Destination of principal agricultural products exported from the United States, 1927-28 to 1930-31—Continued

			Year	beginnin	g July			
Article and country to which exported		Quar	tity			Per cen	t of tota	<u>.</u>
	1927–28	1928-29	1929-30	1930-31	1927-28	1928-29	1929-30	1930-31
ANIMAL AND ANIMAL PRODUCTS—continued		4 000	4 000	4 000		70	D	
Lard, neutral: Netherlands	1,000 pounds 6,784 5,623 5,096 1,228 1,176 696 1,206	1,000 pounds 4,710 4,023 8,919 895 894 649 1,463	1,000 pounds 6, 260 3, 010 2, 320 755 1, 379 787 1, 197	1,000 pounds 3, 264 1, 421 1, 526 529 1, 453 766 1, 015	Per cent 28. 5 23. 6 21. 4 5. 2 4. 9 2. 9 5. 1	Per cent 25. 7 22. 0 21. 4 9 4. 9 3. 5 8. 0	Per cent 37. 3 17. 9 13. 8 4. 5 8. 2 4. 7 7. 2	Per cent 30. 3 13. 2 14. 2 4. 9 13. 5 7. 1 9. 5
Total Europe Other countries	21, 809 1, 990	16, 553 1, 762	15, 708 1, 075	9, 97 <u>4</u> 785	91. 6 8. 4	90. 4 9. 6	93. 6 6. 4	92. 7 7. 3
Total	23, 799	18, 315	16, 783	10, 759	100.0	100. 0	100.0	100.0
Oleo oil: Germany Notherlands United Kingdom Norway Greece Other Europe	18, 267 17, 608 16, 092 3, 596 454 5, 594	16, 835 16, 744 16, 328 2, 763 602 6, 209	14, 630 22, 158 11, 735 2, 549 750 6, 218	13, 934 15, 868 13, 179 2, 018 1, 587 6, 053	28. 2 27. 2 24. 8 5. 5 . 7 8. 6	26. 6 26. 5 25. 8 4. 4 1. 0 9. 8	23. 9 36. 3 19. 2 4. 2 1. 2 10. 2	25, 4 28 9 24 0 3, 7 2, 9 10, 9
Total EuropeOther countries		59, 481 8, 706	58, 040 3, 048	52, 639 2, 322	95. 0 5. 0	94, 1 5. 9	95. 0 5. 0	95. 8 4. 2
Total	64, 851	63, 187	61, 088	54, 961	100. 0	100.0	100.0	100.0
VEGETABLE PRODUCTS	1,000 bales 3	1,000 bales 3	1,000 bales 3	1,000 bales 3				
Octton, excluding linters: Germany. United Kingdom France. Italy. Other Europe.	2, 090 1, 443	1, 891 1, 918 841 765 1, 183	1,770 1,306 860 705 926	1, 752 1, 108 986 495 772	26. 5 18. 3 11. 5 9. 0 16. 2	9.9	24. 9 18. 4 12. 1 9. 9 13. 2	24. 9 15. 7 14. 0 7. 0 10. 9
Total Europe Japan Other countries	6.428	6, 598 1, 373 549	5, 567 1, 071 458	5, 113 1, 233 702	81. 5 12. 8 5. 7	77. 4 16. 1 6. 5	78. 5 15. 1 6. 4	72. 8 17. 8 10. 0
Total.		8, 520	7,096	7, 048	100.0	100.0	100.0	100.
Linters: Germany France. United Kingdom. Belgium Other Europe.	132 36 22 7 15	120 82 16 12 18	70 26 7 8 14	56 27 11 5	15. 6 9. 5 3. 0	14.6 7.3 5.5	18. 2 4. 9 5. 6	42.4 20.4 8.3 10.6
Total Europe	212	198 19 2	125 17 1	113 16 3	7.8	8.7	1 11.9	12.
Total	231	219	143	132	100.0	100.0	100.0	100.
Fruits: Dried— Apples— Germany Netherlands Sweden Denmark United Kingdom Other Europe	1,000 pounds 10,871 3,315 2,524 1,384 1,018 1,617	22, 085 12, 451 2, 985 1, 074 2, 618	11, 425 4, 323 3, 015 894	18, 476 8, 763 1, 846 1, 163	50.15.3 15.3 11.6 6.4	24.9	18.2 12.7	23. 4. 3. 4.
Total EuropeOther countries		48, 808	_	37, 590 52	3 95. 3 4.	97. 6 5 2. 4	97. ( 4 3. (	
Total		50,024	23, 769	38, 12	1 100.	0 100.	100.0	100.

<sup>3</sup> Bales of 500 pounds.

Table 443.—Destination of principal agricultural products exported from the United States, 1927-28 to 1930-31—Continued

			Yea	r beginnir	ıg July			
Article and courtry to which exported		Quar	ntity			Per cen	i of tota	ıl
	1927-28	1928-29	1929-30	1930-31	1927–28	1928-29	1929-30	1930-31
VEGETABLE PRODUCTS—continued								
Fruits—Continued. Dried—Continued. Apricots— Germany. Netherlands. United Kingdom Belgium Norway. Sweden. Other Europo.	1,000 pounds 6,512 4,651 1,964 1,374 1,260 994 4,403	1,000 pounds 7,742 3,750 1,422 1,691 988 776 5,910	1,000 pounds 6,091 2,493 1,019 891 1,327 939 4,104	1,000 pounds 8,695 2,933 1,243 1,932 786 835 5,568	Per cent 27. 5 19. 6 8. 3 5. 8 4. 2 18. 6	Per cent 31. 4 15. 2 5. 8 6. 9 4. 0 3. 1 24. 0	Per cent 31. 9 13. 1 5. 3 4. 7 6. 9 21. 5	Per cent 36. 8 12. 4 5. 3 8. 2 8. 3 3. 5 23. 5
Total EuropeCanadaOther countries	21, 158 1, 920 606	22, 279 1, 614 759	16,864 1,431 806	21, 992 1, 036 619	89. 3 8. 1 2. 6	90. 4 6. 5 3. 1	88.3 7.5 4.2	93. 0 4. 4 2. 6
Total	23, 684	24, 652	19, 101	23, 647	100.0	100.0	100.0	100.0
Prunes: Germany. United Kingdom. France. Netherlands. Sweden. Other Europe.	79, 732 45, 601 27, 390 23, 140 7, 047 40, 664	77, 883 40, 836 59, 822 17, 286 5, 434 39, 533	44, 780 28, 143 9, 298 5, 584 6, 744 22, 209	97, 631 39, 824 46, 571 18, 903 8, 712 56, 174	30. 6 17. 5 10. 5 8. 9 2. 7 15. 6	28. 5 15. 0 21. 9 6. 3 2. 0 14. 5	31. 3 19. 7 6. 5 3. 9 4. 7 15. 6	33. 0 13. 4 15. 7 6. 4 2. 9 10. 0
Total Europe Canada Other countries	223, 574 23, 272 13, 779	240, 794 18, 965 13, 292	116, 857 16, 187 9, 945	267, 815 16, 456 11, 983	85. 8 8. 9 5. 3	88. 2 6. 9 4. 9	81. 7 11. 3 7. 0	90. 4 5. 6 4. 0
Total	260, 625	273, 051	142, 989	296, 254	100. 0	100.0	100.0	100.0
Raisins: United Kingdom Germany Netherlands Denmark Other Europe	70, 034 18, 733 18, 598 1, 593 22, 967	71, 375 23, 022 24, 278 2, 244 31, 866	36, 443 14, 059 7, 436 1, 286 18, 391	40, 293 14, 628 8, 827 1, 385 19, 807	36. 3 9. 7 9. 6 . 8 11. 9	32. 2 10. 4 10. 9 1. 0 14. 4	28. 3 10. 9 5. 8 1. 0 14. 3	32. 2 11. 7 7. 1 1. 1 15. 8
Total Europe Canada China. Japan. Other countries	131, 925 40, 148 4, 144 3, 086 13, 796	152, 785 39, 685 7, 574 2, 961 18, 801	77, 615 28, 668 4, 791 2, 992 14, 631	84, 940 22, 894 1, 816 2, 140 13, 310	68. 3 20. 8 2. 1 1. 6 7. 2	68. 9 17. 9 3. 4 1. 3 8. 5	60. 3 22. 3 3. 7 2. 3 11. 4	67. 9 18. 3 1. 5 1. 7 10. 6
Total	193, 099	221, 756	128, 697	125, 100	100.0	100.0	100.0	100.0
Fresh— Apples— United Kingdom. Germany. Netherlands. Belgium Other Europe.	1,000 barrels 1,004 27 2 1 150	1,000 barrels 1,720 236 201 821 308	1,000 barrels 953 50 17 14 175	1,000 barrels 954 404 334 313 203	74. 4 2. 0 . 2 . 1 11. 1	57. 2 7. 9 6. 7 10. 7 10. 2	66. 8 3. 5 1. 2 1. 0 12. 2	38, 5 16, 3 13, 5 12, 6 10, 6
Total EuropeOther countries	1, 184 165	2, 786 219	1, 209 218	2, 268 211	87. 8 12. 2	92. 7 7. 3	84. 7 15. 3	91. 5 8. 5
Total	1, 849	8, 005	1, 427	2, 479	100.0	100.0	100.0	100.0
Apples— United Kingdom Germany Netherlands Other Europe	1,000 boxes 2,709 737 72 507	1,000 boxes 4,836 2,695 1,687 839	1,000 boxes 2,655 046 272 598	1,000 boxes 3,991 3,476 2,417 1,501	50. 3 13. 7 1. 3 9. 5	40. 2 22. 4 14. 0 7. 0	44.3 15.8 4.5 9.9	30. 9 26. 9 18. 7 11. 7
Total Europe Canada Other countries	4, 025 542 817	10, 057 636 1, 333	4, 471 500 1, 027	11, 385 475 1, 044	74.8 10.1 15.1	83.6 5.3 11.1	74.5 8.3 17.2	, 88. 2 3. 7 8. 1
Total	5, 384	12,026	5, 998	12, 904	100.0	100.0	100.0	100.0

Table 443.—Destination of principal agricultural products exported from the United States, 1927-28 to 1930-31—Continued

1			1 Dat	. повшии	te a mrå			
Article and country to which exported		Quan	tity			Per cen	t of tota	1
	1927-28	1928-29	1929–30	1930-31	1927-28	1923-29	1929-30	1930-31
VEGETABLE PRODUCTS—continued								
Fruits—Continued. Fresh—Continued. Oranges— United Kingdom Canada. Other countries	1,000 boxes 402 2,346 240	1,000 boxes 709 3,151 363	1,000 boxes 796 2,568 310	1,000 boxes 669 2,873 442	Per cent 13. 5 78. 5 8. 0	Per cent 16.8 74.6 8.6	Per cent 21. 7 69. 9 8. 4	Per cent 16 8 72.1 11.1
Total	2, 988	4, 223	3, 674	3, 984	100.0	100.0	100.0	100.0
Grapefruit— United Kingdom Canada Germany France Other countries	333 349 6 4 27	561 335 8 4 32	496 308 10 5 35	741 408 23 7 43	46.3 48.5 .8 .6 3.8	59.7 35.6 .9 .4 3.4	58, 1 36, 1 1, 2 . 6 4, 0	60, 6 33, 4 1, 9 . 6 3, 5
Total	719	940	854	1, 222	100.0	100.0	100.0	100.0
Cannod— United Kingdom Other Europe	1,000 pounds 177, 258 38, 539	1,000 pounds 236,754 47,646	1,000 pounds 203, 151 40, 171	1,000 pounds 215, 575 26, 667	69. 3 15. 0	71. 8 14. 4	71. 6 14. 2	79. 5 9. 9
Total Europe Canada Other countries	215, 795 17, 993 22, 088	284, 400 22, 769 22, 654	243, 322 20, 438 19, 957	242, 242 13, 693 15, 161	84. 3 7. 0 8. 7	86. 2 6. 9 6. 9	85. 8 7. 2 7. 0	89. 4 5. 1 5. 5
Total	255, 876	329, 823	283, 717	271, 096	100.0	100. 0	100.0	100.0
Grains and grain products: Barley (grain)— Germany United Kingdom Netherlands Belgium Other Europe	1,000 bushels 11,599 10,151 2,581 642 634	1,000 bushels 13,085 13,161 3,909 1,782 749	1,000 bushels 1,521 9,370 479 651 756	1,000 bushels 0 8,670 8 863 537	7.1	23. 0 23. 1 6. 9 3. 1 1. 2	7. 1 43. 5 2. 2 3. 0 3. 5	0 83.4 .1 8.3 5.2
Total Europe Canada. Other countries	25, 607 10, 453 520	32, 686 23, 886 424	12, 777 8, 144 623	10, 078 9 303	28.6	57. 3 41. 9 . 8	59. 3 37. 8 2. 9	97.0 .1 2.9
Total	36, 580	56, 996	21, 544	10, 390	100.0	100. 0	100.0	100.0
Corn (grain)— Netherlands Germany United Kingdom Denmark Canada Cuba Mexico Other countries	4, 311 2, 520 1, 885 845 6, 454 1, 021 323 1, 015	7, 977 4, 241 8, 237 896 11, 082 765 572 6, 974	126 0 20 0 7,390 226 1,297 295	1 1	13 7 10. 8 4. 6 35. 1 5. 6 1, 8	10 4 20. 2 2. 2 27. 2 1. 9 1. 4	0 .2 0 79.0 2.4 13,9	55.9 .7 32.5
Total	18, 374	40,744	9, 354	2, 529	100.0	100.0	100.0	100.0
Oats— United Kingdom. Belgium. Germany. France. Other Europe.	645	1, 177 257 0 141	13 0 0		10. 7 2. 0 1. 9 0 . 7 0 5. 8	2.4	0.	0 0 0 0
Total EuropeCanada Cuba	1, 243 3, 426 1, 028	6, 501 861 51	3, 913 490 44	686	1 17. 0 5 1. 0	59, 9	84. 4 10. 6	75.0 6.7 3.9
Total		10, 849	4, 035	90	7 100.	100.0	100.0	100.0

Table 443.—Destination of principal agricultural products exported from the United States, 1927-28 to 1930-31—Continued

			Year	beginnin	g July			
Article and country to which exported		Quar	tity			Per con	l of tota	ı
	1927-28	1928-29	1929-30	1930-31	192728	1028-20	1929-30	1930 31
VEGETABLE PRODUCTS—continued								
Grains and grain products—Contd. Oatmeal— United Kingdom Finland Netherlands Belgium Other Europe	1,000 bushels 14,447 9,471 7,485 2,890 5,456	1,000 bushels 23,775 17,335 14,525 3,064 9,249	1,000 bushels 8,358 8,441 7,804 801 2,637	1,000 bushels 4,533 431 9,479 1,955 1,100	Per cent 21. 2 13. 9 11. 0 4. 2 8. 0	Per cent 21.4 17.8 14.9 3.2 9.0	Per cent 13 0 14 1 13 0 1.3 4.5	Per cent 12. 1 1. 1 23. 9 4. 9 2. 8
Total Europe South America Mexico Canada British India Other countries	39, 749 9, 757 3, 739 3, 582 1, 770 9, 595	67, 948 11, 389 3, 802 1, 556 1, 594 10, 956	28, 041 10, 431 4, 054 5, 402 2, 013 10, 012	17, 858 8, 093 3, 202 1, 046 1, 400 8, 287	58. 3 14. 3 5. 5 5. 3 2. 6 14. 0	69. 9 11. 7 3. 9 1. 6 1. 6 11. 3	46 8 17.4 6.8 9.0 3.4 16.6	44, 8 20, 3 8, 0 2, 6 3, 5 20, 8
Total	68, 102	87, 245	59, 953	39,886	100 0	100.0	100.0	100, 0
Rice (grain)— Germany United Kingdom Belgium France Other Europe	35, 851 35, 459 12, 778 12, 388 87, 343	43, 799 41, 812 23, 167 16, 065 48, 274	37, 915 35, 854 8, 959 13, 419 35, 602	34, 527 32, 364 14, 735 18, 187 42, 877	15. 6 15. 4 5. 5 5. 4 16. 2	14. 0 13. 3 7. 4 5. 1 15. 4	16. J 15. 2 3. 8 5. 7 15. 2	15, 4 14, 4 6, 6 8, 1 10, 0
Total Europe South America Canada Central America Japan Other countries	133, 819 41, 205 14, 227 5, 888 2, 020 33, 273	173, 117 78, 719 19, 800 5, 852 14, 609 21, 308	131, 749 69, 297 18, 239 5, 031 935 9, 908	142, 690 54, 899 17, 342 4, 607 378 4, 633	58. 1 17. 9 6. 2 2. 6 . 9 14. 3	55. 2 25. 1 6. 3 1. 9 4. 7 6. 8	56. 0 29. 5 7. 8 2. 1 . 4 4. 2	63. 5 24. 4 7. 7 2. 1 . 2 2. 1
Total	230, 432	313, 405	235, 159	224, 549	100.0	100.0	100.0	100.0
Rye— United Kingdom	1,000 bushels 1,710 1,408 1,245 468 298 145 135 0 567	1,000 bushels 1,174 868 864 406 57 13 9 0 490	1,000 bushels 21 0 21 69 3 11 0 0	1,000 bushels 0 21 0 48 0 17 41 40	6. 6 5. 4 4. 8 1. 8 1. 1 . 6 . 5 0	12.6 9.3 3.9 4.3 .6 .1 .1	.8 0.8 2.7 .1 .4 0	0 11, 7 0 26, 8 0 9, 5 22, 0 22, 3
Total Europe Canada Other countries	5, 974 20, 080 10	3, 381 5, 913 52	142 2,347 49	168 0 11	22. 0 77. 0 . 1	36. 2 63. 3 . 5	5. 6 92. 5 1. 9	93. 9 0 6. 1
Total	26, 064	9, 346	2, 538	179	100.0	100. 0	100.0	100 0
Wheat— United Kingdom Netherlands Italy Belgium Germany France Other Europe	36, 574 11, 559 10, 450 8, 797 5, 582 5, 127 11, 114	16, 276 5, 149 5, 047 3, 232 1, 674 2, 215 13, 052	23, 931 0, 197 905 6, 314 4, 769 2, 214 12, 349	17, 863 6, 943 3, 675 7, 306 1, 722 7, 850 6, 516	25. 1 7. 9 7. 2 6. 0 3. 8 3. 5 7. 6	15.8 5.0 4.9 8.1 1.6 2.1 12.7	20.0 6.7 1.0 6.9 5.2 2.4 13.3	23. 4 9. 1 4. 8 9. 6 2. 3 10. 3 8. 5
Total Europe Canada Japan China Other countries	89, 203 45, 563 6, 304	46, 645 41, 190 3, 782 1, 241 10, 256	56, 679 16, 777 9, 185 140 9, 394	51, 884 12, 493 3, 063 1, 872 6, 965	61. 1 31. 2 4. 3 0 3. 4	45. 2 39. 0 3. 7 1. 2 10. 0	61. 5 18. 2 10. 0 0. 2 10. 1	68. 0 16. 4 4. 0 2. 5 9. 1
Total.	145, 999	103, 114	92, 175	76, 277	100.0	100. 0	100.0	100.0

Table 443.—Destination of principal agricultural products exported from the United States, 1927-28 to 1930-31—Continued

			Year	beginnir	ng July			
Article and country to which exported	····	Quar	ntity			Per cen	t of tota	1
	1927-28	1928-29	1929-30	1930-31	1927-28	1928-29	1929-30	1930-31
VEGETABLE PRODUCTS—continued								
Grains and grain products—Contd. Wheat, flour— Netherlands. United Kingdom	1,000 pounds 1,530 1,224 534 113 1,092	1,000 pounds 1,084 886 312 49 1,377	1,000 pounds 1,031 1,560 452 30 1,667	1,000 pounds 1,330 1,378 243 12 1,570	Per cent 11. 9 9. 5 4. 2 . 9 13. 2	·	7. 9 12. 0 3. 5 2 12. 9	Per cent 11.8 11.7 2.1 .1 13.4
Total Europe Cuba Hong Kong Brazil (hina. Philippine Islands. Contral America. Other West Indies ' Kwantung. Other countries	5, 093 1, 216 929 873 790 727 697 676 136 1, 084	3, 708 1, 204 868 831 1, 242 802 752 809 428 2, 244	4,740 1,199 752 780 553 730 684 663 891 2,002	4, 533 968 843 671 1, 000 640 658 589 382 1, 473	39.7 9.5 7.2 6.8 6.7 5.4 5.3 1.1	28. 8 9. 3 6. 7 6. 4 9. 6 6. 2 5. 8 6. 3 3. 3	36. 5 9. 2 5. 8 6. 0 4. 3 5. 6 5. 3 5. 1 6. 9 15. 3	38.6 88.2 5.7 5.5 5.6 5.0 2.6
Total	12, 821	12,888	12, 994	11, 757	100, 0	100.0	100.0	100.0
Hops— United KingdomBelgium. Other Europe	1,000 pounds 6,121 255 1,342	1,000 pounds 4,175 129 1,033	1,000 pounds 3,255 93 653	1,000 pounds 2,745 77 906	51.8 2.2 11.3	47. 2 1. 5 11. 7	47. 9 1. 4 9. 6	49. 1 1. 4 16. 2
Total Europe Canada Other countries	7, 718 3, 168 926	5, 337 2, 838 661	4, 001 2, 522 270	3, 728 1, 685 180	65.3 26.8 7.9	60. 4 32. 1 7. 5	58. 9 37. 1 4. 0	66.7 30.1 3.2
Total	11,812	8, 836	6, 793	5, 593	100.0	100.0	100.0	100.0
Oil cake and oil-cake meal— Cottonseed cake— Denmark Germany Other Europe.	450, 524 58, 778 17, 611	319, 596 49, 844 25, 790	168, 488 39, 505 3, 371	67, 820 0 21	11.2	12.6	18.7	95.8 0 .1
Total EuropeOther countries		395, 230 27	211, 364 202	67, 841 2, 918	100. 0 0	100. 0 0	99.9 .1	95.9 4.1
Total	527, 023	395, 257	211, 566	70, 759	100.0	100.0	100.0	100.0
Cottonseed meal— United Kingdom	45, 844 39, 157 11, 655 30, 102	1 46, 312	46, 955 19, 752 1, 019 30, 422	3, 297 0 112 2, 299	8. 5	26. 1 5. 7	15.4	0,7
Total Europe ('anada Other countries	128, 758	12,956	98, 148 26, 347 4, 112	5, 708 8, 543 2, 247	92.2	7.3	20.5	51.8
Total	137, 498	177, 415	128, 607	16, 498	100.0	100.0	100.0	100.0
Linseed or flaxseed cake— Netherlands	305, 321 235, 883 38, 698 9, 151	204, 205	323, 537 184, 988 48, 745 42, 116	141, 50, 89, 84, 42, 49, 15, 30	5 51.8 9 40.0 5 6.0 8 1.0	32.7	7   30.7 5   8.1	31.0 14.7
Total EuropeOther countries	_ 589, 053	624, 086		289, 15 59	5 100. 0	99. 9		
Total	_ 589, 174	624, 913	601, 819	289, 74	8 100.	0 100.	100.0	100.0

Excludes Bermuda.

Table 443.—Destination of principal agricultural products exported from the United States, 1927-28 to 1930-31—Continued

	Year beginning July							
Article and country to which exported		Quar	ntily			Per cen	t of tota	nl
	1927-28	1928-29	1929-30	1930-31	1927-28	1928-20	1920-30	1930-31
VEGETABLE PRODUCTS—continued					,			
Oils, vegetable: Cottonseed— Canada Mexico Cuba Argentina Japan Panama Other countries	1, 108	1,000 pounds 20,550 2,374 1,836 912 911 788 2,160	1,000 pounds 21,666 947 2,448 253 1,179 1,063 1,442	1,000 pounds 9,152 3,954 9,855 94 1,146 768 1,384	Per cent 80.4 8.7 3.3 1.8 1.4 1.2 3.2	Per ce nt 69. 6 8. 0 6. 2 3. 1 3. 1 2. 7 7. 3	Per cent 77. 1 3. 0 7. 7 . 8 3. 7 3. 3 4. 4	Per cent 31.7 15 0 37.4 -4 4.3 2.9 5.3
Total		29, 531	31, 998	26, 353	100. 0	100.0	100, 0	100.0
Sugar, refined: United Kingdom Norway France Other Europe	1,000 short tons 35 13 1	1,000 short tons 24 14 2 6	1,000 short tons 25 6 1	1,000 short tons 23 2 2 7	33. 0 12. 8 . 9 11. 3	18. 8 10. 9 1. 6 4. 6	31. 6 7. 6 1. 3 10, 1	32. 9 2. 9 2. 9 9. 9
Total Europe. Uruguay West Indies and Bermudas British Africa Canada. Mexico Panama. Other countries	13 5 5 4 2 2	46 26 6 12 7 5 2	40 6 5 6 3 4 3 12	34 7 5 5 2 1 4	57. 5 12.3 4.7 4.7 3.8 1.9 1.0 13.2	35. 0 20. 3 4. 7 9. 4 5. 5 3. 9 1. 6 18. 7	50. 6 7. 6 6. 3 7. 6 3. 8 5. 1 3. 8 15. 2	49, 6 10, 0 7, 1 7, 1 2, 9 1, 4 5, 7
Total	106	128	79	70	100.0	100. 0	100.0	100 0
Tobacco, leaf. Bright flue cured— United Kingdom————————————————————————————————————	1,000 pounds 157, 506 13, 378 21, 197	1,000 pounds 171, 515 13, 841 25, 197	1,000 pounds 186, 583 8, 150 89, 932	1,000 pounds 184,448 12,274 28,172	47. 9 4. 1 6. 4	4L. 4 3. 3 6. 2	43. 4 1. 9 9. 3	42.6 2.8 6.6
Total Europe China 4 Australia Canada Japan British India Other countries	08, 842 21, 488 14, 049	210, 553 131, 254 18, 146 14, 601 14, 564 5, 884 18, 947	234, 665 128, 141 19, 492 13, 660 10, 395 3, 874 19, 712	224, 894 143, 980 23, 173 11, 210 11, 604 1, 162 16, 656	58, 4 20, 9 6, 5 4, 3 3, 5 1, 5 4, 9	50. 9 31. 7 4. 4 3. 5 3. 5 1. 4 4 6	51.6 20.8 4.5 3.2 2.4 4.6	52.0 33.3 5.4 2.6 2.7 .3 3 7
Total	328, 924	413, 949	429, 942	432, 688	100.0	100.0	100.0	100.0

Bureau of Agricultural Economics. Compiled from Monthly Summary of Foreign Commerce of the Umted States, June 1881es, 1928–1931, and official records of the Bureau of Foreign and Domestic Commerce.

<sup>4</sup> Includes Hong Kong and Kwantung.

Table 444.—Principal agricultural products imported into the United States, by countries, 1927-28 to 1930-31

	countrie:	8, 1937–3	38 to 198	30-31				
			Yoar	beginning	July			
Article and country from which imported		Quun	lity			Per cen	t of tota	1
when imposed	1927-29	1928-29	1929-30	1930-31 1	1927-24	1929-29	1929-30	1930-311
Animals and animal products Cattle: Canada Mexico_ Other countries_	Thou- sands 313 201	Thou- sands 256 300 1	Thon- sands 192 226 1	Thou- sands 26 56 1	Per cint 62 6 37. 2	Per cent 45. 2 51. 6	Per cent 45. 8 53. 9	Per cent 31.3 67.5
Total	518	566	419	83	100.0	100, 0	100.0	100.0
Butter: United Kingdom	1,000 pounds 870 761 453	1,000 pounds 58 902 279	1,000 pounds 171 1,109 38	1,000 pounds 17 172 26	17. 6 15. 4 9. 1	1. 8 27. 3 8. 5	6. 0 38. 9 1. 3	1. 8 12. 9 2. 0
Total Europe	2, 084 2, 396 275 200	1, 239 1, 674 237 149	1, 318 1, 141 112 250	215 877 162 75	42. 1 48. 4 5. 5 4. 0	37. 6 50. 7 7. 2 4. 5	46. 2 40. 0 5. 0 8. 8	16. 2 66. 0 12. 2 5. 6
Total	4, 955	3, 299	2, 851	1, 329	100.0	100.0	100 0	100.0
Choese: Ifuly	31, 332 16, 449 5, 874 3, 736 5, 983	38, 337 19, 731 6, 243 3, 525 6, 052	30, 969 19, 386 6, 058 2, 917 6, 509	29, 430 15, 178 4, 279 2, 372 5, 716	41. 5 21. 8 7. 8 5. 0 7. 9	45. 3 23. 3 7. 4 4. 2 7. 1	47.3 24.8 7.7 3.7 8.3	50.8 26.2 7.4 4.1 9.8
Total Europe Canada	63, 374 11, 439 611	73, 888 9, 381 1, 337	71, 859 5, 895 506	56, 975 817 180	84 0 15. 2 . 8	87.3 11.1 1.6	91. 8 7. 5 . 7	98. 3 1. 4 . 3
Total	75, 424	84, 606	78, 261	57, 972	100. 0	100. 0	100.0	100.0
Eggs, in the shell: Itong Kong China Canada. Other countries.	1,000 dozen 199 40 13	1,000 dozen 236 28 13 14	1,000 dozen 250 15 60	1,000 dozen 263 19 15 4	77. 7 15. 6 5. 1 1. 6	81. 1 9. 6 4. 5 4. 8	74. 2 4. 5 17. 8 3. 5	87. 4 6. 3 5. 0 1. 3
Total	250	291	337	301	100.0	100.0	100.0	100.0
Eggs and egg yolks (dried, frozon, and preserved). China	1,000 pounds 5,400 248 211	1,000 pounds 20, 582 3, 285 503	1,000 pounds 18, 206 4, 498 253	1,000 pounds 7,918 76 62	91. 7 4. 2 4. 1	13, 4	79. 3 19. 6 1. 1	98, 3 . 0
Total	5, 901	21, 160	22, 957	8, 056	100 0	100. 0	100.0	100.0
Egg albumen: China Other countries	2, \36 78	3, 431	4, 868 450	2, 208	97. 3 2. 7			99.4
Total -	2, 914	3, 508	5, 319	2,221	100. 0	100 0	100.0	100 0
Fibers, animal: Silk, raw, in skeins recled from cocoon -	d				1			
Japan China Other countries	61, 673 9, 816 1, 269	63, 415 12, 326 1, 455	61, 213 12, 717 3, 733	67, 309 10, 432 4, 038	13.0	16.0	16.4	12.8
Total	75, 758	77, 196	77, 693	81, 779	100.0	100.0	100 0	100
Wool, unmanufactured Chriset wool - United Kingdom France China British India Argentine Pulestine and Syria	32, 123 5, 414 55, 999 10, 811 8, 921 8, 420	33, 861 4, 470 53, 599 14, 390 19, 820 3, 953	23, 326 4, 260 36, 931 11, 106 21, 405 10, 469	1, 814 33, 608 5, 163 25, 567 4, 388	3.7 38.4 7.6 5.5	7 2. 7 5 32. 5 1 9. 7 1 12. 0	3. 0 26. 2 7. 0 17. 3	1. 32. 5. 21. 4.
Other countries _	23, 409		30, 623	1	1	-	-	
Total	115, 480	161,713	141, 111	103, 261	- 100.	100.0	1 100.0	

<sup>1</sup> Proliminary.

Table 444.—Principal agricultural products imported into the United States, by countries, 1927-28 to 1930-31—Continued

		<del></del>	Yeur	boginning	July			
Article and country from which imported		Quar	itlty			Per cen	t of toti	ıl
	1927-25	1928-29	1929-30	1930-31	1925 28	1925 20	1929-30	1930-31
ANIMALS AND ANIMAL PROD- UCTS—continued								
Fibers, animal—Continued. Wool, unmanufactured—Con. Clothing wool— United Kingdom Australia. Canada. Argentina. Chile. New Zealand. Uruguay. Other countries.	1,000 pounds 4,169 5,515 2,838 2,545 1,677 1,670 213 747	1,000 pounds 2,490 5,936 1,601 1,872 1,625 2,081 1,002 1,732	1,000 pounds 1,807 5,600 1,129 2,300 1,004 3,514 1,275 2,017	1,000 pounds 1,500 2,871 312 354 361 366 143 361	Per dent 21. 5 28. 5 11. 6 13. 1 8. 7 8. 6 1. 1 3. 9	Per cent 13.2 27 10.2 2.5 11.3 9.4	Per Cent 9.6 30.2 6.0 12.2 4.8 15.6 5.8	Per cent 22.4 43.4 43.4 65.4 65.4 65.4 65.4 65.4 65.4 65.4 65
Total	19, 374	18,408	18, 856	6, 558	100.0	100. 0	100.0	100.0
Combing wool— United Kingdom Australia. Argentina New Zeeland Urugusy Other countries.	17, 344 21, 902 11, 424 8, 260 6, 962 14, 300	12,319 17,906 12,875 8,577 20,341 11,460	8,784 14,911 10,674 3,003 11,815 9,197	2, 933 22, 018 1, 898 2, 065 4, 553 5, 261	21. 6 27. 4 14. 2 10. 3 8. 7 17. 8	14. 8 21. 4 15. 4 10. 3 24. 4 13. 7	15. 0 25. 5 18. 3 5. 3 20. 2 15. 7	7. ( 56. ( 4. ) 5. ; 11. )
Total	80, 282	83,478	58, 474	38, 728	100 0	100.0	100.0	100, (
Hair of the Angora goat (mo- hair), alpace, etc.— United Kingdom.— Turkey (Europe and Asia) British South Africa.— Peru.— Ohina.— Other countries.	541 983 660 425 184 97	384 2,034 884 716 145 175	301 553 870 622 48 52	350 9 407 149 26 58	18. 7 34. 0 22. 8 14. 7 6. 4 3. 4	8. 9 46. 9 20. 4 16 5 3. 3 4. 0	19. 2 27. 2 18. 2 30 6 2. 4 2. 4	35. ( 40 : 14. ( 2. ( 5. )
Total	2,890	4,338	2, 036	999	100.0	100.0	100.0	100. (
Sausage casings: Germany Argentina Canada Australia China Now Zealand Urugasy Other countries	1, 353 4, 975 3, 928 2, 213 1, 640 1, 223 917 3, 296	2,509 5,719 2,959 2,507 1,445 1,086 1,317 4,288	1, 818 5, 459 2, 218 3, 024 1, 256 1, 470 1, 527 4, 789	763 3, 897 1, 808 1, 638 918 708 736 2, 797	6. 9 25. 5 20. 1 11. 3 8. 4 6. 3 4. 7 10. 8	11. 8 26. 0 13. 6 11. 8 6. 6 4. 9 6. 0 19. 3	8. 4 25. 3 10. 3 14. 0 5. 8 6. 8 7. 1 22. 3	5. 129. 13. 12. 12. 16. 16. 16. 120. 1
Total	19, 545	22,010	21, 558	13, 355	100, 0	100, 0	100.0	100, (
VEGETABLE PRODUCTS							7	•
Cocoa or cacao beans: Germany British West Africa. Braz II. Domunican Republc British West Indies and Ber-	39, 591	17, 424 146, 780 87, 338 50, 353	8, 565 145, 400 95, 516 41, 120	11, 506 151, 524 75, 726 87, 898	7. 1 32. 6 24. 4 9. 6	4. 2 35. 0 20. 8 12. 0	2. 0 34. b 22. 6 0. 7	2.   36.   18. ! 9.
mudas Ecuador Venezuela Other countries	38, 217 19, 210 14, 482 36, 744	41,933 16,939 18,008 40,509	39, 276 14, 754 19, 302 58, 005	41, 805 13, 170 17, 338 66, 475	9.3 4.7 3.5 8.8	10.0 4.0 4.3 9.7	9. 3 8. 5 4. 6 13. 8	10. 3. 4. 15.
Total	411,543	419, 243	421, 938	415, 442	100.0	100.0	100.0	100.
Ooffee: Brazil. Colombia. Central America. Other countries.		933, 056 263, 236 54, 774 184, 004	1,011,480 351,333 56,763 142,532	1, 196, 881 830, 379 53, 276 148, 033	69. 0 17. 0 4. 2 9. 8	65. 0 18. 3 3. 8 12. 9	64. 7 22. 5 3. 6 9. 2	69. 19. 3. 8.
Total	1,535,392	1, 435, 070	1, 562, 058	1, 728, 569	100.0	100.0	100.0	100.

Table 444.—Principal agricultural products imported into the United States, by countries, 1927-28 to 1930-31—Continued

		<del></del>		beginning	T7			
Article and country from					July	······································		
which imported		Qua	ntity			Per cen	t of tota	1
	1927-28	1924-29	1929-30	1930-31	1027-23	1928-29	1929-30	1930-31
VEGLTABLE PRODUCTS - contd.								
Fibers, vegetable: C'ofton, raw - Egypt C'hma British Indim Mesleo Peru Other countries.	1,000 pounds 91,581 32,123 12,467 11,508 9,146 15,625	1,000 pounds 135,007 18,554 25,736 26,004 8,636 13,517	1,000 pounds 86, 872 22, 046 28, 207 19, 456 9, 151 31, 705	1,000 pounds 10,183 14,883 16,528 6,806 959 1,833	Per cent 53. 9 18 3 7. 1 6 6 5 2 8. 9	Per cent 59. 4 8. 2 11. 3 11. 4 3 8 5 9	Per cent 41 0 11.2 14.3 0.9 4 6 16 0	Per cent 19, 9 29, 1 32 3 13, 3 1 9 3, 5
Total.	175, 450	227, 454	197, 657	51, 192	100.0	100 0	100 0	100 0
Flax, unmanufactured United Kingdom Latvia Belgium Netherlands Russia in Europe Estonia Other Europe	Long lons 1, 800 1, 520 739 253 149 113 613	Long tons 1, 758 2, 176 757 208 201 0 2×3	Long tons 1, 768 2, 231 810 231 1, 127 31 664	Long tons 383 1, 926 536 154 155 0 275	Per cent 33. 1 28. 0 13. 6 4. 7 2 7 2 1 11. 2	Per cent 31. 1 38 5 13. 4 8 7 5. 2 0 5. 0	Per cent 25 2 31. 8 11. 5 3 16. 1 9. 5	Per cent 10.6 53.5 14.9 4.3 4.3 0 7.7
Total Europe Canada Other countres	5, 187 126 121	5, 476 72 102	6, 862 97 54	3, 429 137 32	95. 4 2 3 2. 3	96. 9 1. 3 1. 8	97. 8 1. 4 . 8	95. 3 3. 8 . 9
Total	5, 437	5, 650	7, 013	3, 598	100.0	100.0	100.0	100.0
Manila fiber— Philippine Islands——— Other countries	1,000 long tons 47	1,000 long tons 60 0	1,000 long tons 71 2	1,000 long tons 42 1	97 9 2. 1	100.0	97. 3 2. 7	97. 7 2 3
Total	48	60	73	43	100 0	100.0	100. 0	100 0
Sisal and honequen— Mexico. Dutoh East Indice United Kingdom. ('uba. Other countries.	93 16 0 2 13	95 20 2 2 2 16	57 30 2 3 20	38 25 7 4 10	75. 0 12. 9 0 1. 6 10. 5	70. 4 14. 8 1. 5 1. 5 11. 8	50. 9 26 8 1. 8 2. 7 17. 8	45. 2 29. 8 8. 3 4. 8 11. 9
Total	124	135	113	84	100.0	100 0	100.0	100 0
Fruits; Dried — Currants— Greece Other Europe	1,000 pounds 10,500 56	1,000 pounds 9,178 108	1,000 pounds 9,950	1,000 pounds 8,591	97. 9 . 5	97. 8 1. 2	99.0	90 8
Total Europe. Other countries	10, 856 178	9, 286 96	9, 963 92	8, 504 16	98. 4 1. 6	99. 0 1. 0	99. 1	99.8 .2
Total	11,034	9, 382	10,055	8, 610	100.0	100.0	100.0	100 0
Dates - United Kingdom Iraq Hejuz, Arabia, etc _ Other countrie	6, 937 34, 700 694 1, 747	3, 095 45, 373 476 5, 153	1, 350 48, 804 703 2, 302	5, 544 34, 418 990 1, 476	15. 8 78. 6 1. 6 4. 0	5. 7 83. 9 . 9	2. 5 91. 7 1. 3 4. 5	13 1 81, 1 2, 3 3 5
Total	41, 128	54, 087	53, 250	42, 428	100.0	100. 0	100.0	100 0
Figs— Turkoy (Europe and Asia) Portugal Greece Haly Other countries	16, 566 5, 933 2, 465 1, 943 4, 552	22, 418 4, 401 4, 910 1, 358 2, 473	12, 784 934 6, 084 641 1, 474	9, 998 843 2, 933 1, 018 33	52. 7 18. 9 7. 8 6. 2 14. 4	63. 0 12. 4 13. 8 3. 8 7. 0	4.3 27.8 2,0	67 4 5 7 19 8 6. 9
Total	31, 459	35, 563	21,917	14,825	100.0	100.0	100.0	

Table 444.—Principal agricultural products imported into the United States, by countries, 1927-28 to 1930-81—Continued

			Year	beginning	July			
Article and country from which imported		Quar	ıtıty —	•		Per cen	t of tota	ıl -
	1927-28	1928-29	1929-30	1930-31	1927 28	1928-29	1929-30	1930-31
VEGETABLE PRODUCTS—contd.								
Fruits—Continued. Fresh— Bananas— Central America Jamaica. Cuba. Colombia. Other countries.	1,000 bunches 39,676 13,398 2,730 1,695 6,530	1,000 bunches 42,386 11,722 3,467 1,439 4,516	1,000 bunches 42,764 11,513 4,149 1,171 6,312	1,000 bunches 36, 818 11, 010 3, 562 900 5, 512	Per cent 62 0 20. 9 4 3 2. 6 10. 2	Pcr cent 66. 7 19. 4 5. 5 2. 3 7. 1	Pa cent 61. 9 17. 5 6. 3 1. 8 9. 5	Per cent 63. 7 19. 0 6. 2 1. 6 9. 5
Total	64, 029	63, 530	65, 909	57, 841	100.0	100. 0	100 0	100. 0
Lemons— Italy Other Europe	1,000 boxes 2 1,300 4	1,000 boxes 2 282 8	1,000 boxes 2 1,217	1,000 boxes 2 342 8	Per cent 99.4	1'er cent 97. 7 2. 0	Per cent 99.0	Per cent 97. 7 2 3
Total EuropeOther countries	1, 304 4	390 1	1, 227 2	350 0	99.7	90.7 .3	90.9	100 0 0
Total	1, 308	391	1, 229	350	100.0	100. 0	100.0	100 0
Olives— Spain Grecce Other Europe	1,000 gallons 5,739 144 532	1,000 gallons 6, 209 204 496	1,000 gallons 7,746 308 357	1,000 gallons 6,649 625 144	88. 9 2. 2 8. 2	80.3 2.9 7.1	91. 6 3. 6 4. 3	89 5 8 4 2 0
Total EuropeOther countries	6, 415 43	6, 909 46	8, 411 41	7,418 11	99.3 .7	99.3 .7	99.5	99.9
Total	6, 458	6, 955	8, 452	7, 429	100.0	100.0	100.0	100 0
Grains, flours, etc.: Rice, cleaned (except patna)— Italy————————————————————————————————————	1,000 pounds 3, 971 2, 139 1, 077 20, 786 1, 284 1, 061 3, 376	1,000 pounds 1,032 271 396 17,934 1,022 2,380 2,131	1,000 pounds 1,310 1,622 480 15,094 1,259 213 929	1,000 pounds 1,391 2,419 2,367 15,878 2,700 1,059 812	11. 8 6. 4 3. 2 61. 7 3. 8 3. 2 9. 0	4. 1 1. 1 1. 6 71. 3 4. 1 9. 5 8. 3	6. 3 7. 7 2. 3 72. 1 6. 0 1. 2 4. 4	6. 2 9. 1 8. 9 59. 6 10. 1 4 0 3 1
Total	33, 674	25, 166	20, 946	26, 626	100.0	100 0	100, 0	100, 0
Rice, patna— Netherlands	1, 826 0	<b>2,</b> 320 0	<b>2,</b> 010	2, 051 65	100. 0	100.0	92, 4 7, 6	96.9 3.1
Total	1, 826	2, 329	2, 176	2, 116	100. 0	100 0	100, 0	100.0
Rice, uncleaned— Mexico. Japan British India Other countries	3, 036 2, 516 428 216	5, 004 1, 441 325 890	4, 181 1, 492 694 638	5, 01 1 419 782	50 6 38.6 7.1 3.7	73.3 17.9 4.0 4.8	50. 7 21. 3 9. 9 9. 1	0 81.3 6.8 11.9
Total	5, 996	8, 060	7, 005	6, 162	100.0	100.0	100 0	100.0
Rice, flour, and meal— Netherlands Mexico Japan China Other countries	21 1,981 442 38 124	0 508 504 68 159	100 840 472 51 122	0 0 426 24 153	76.0 17.0 1.5 4.7	0 41.0 40.7 5.5 12.8	9. 2 31. 3 43. 5 4. 7 11. 3	0 0 70.6 4.0 25.4
Total	2, 606	1, 239	1, 085	603	100.0	100.0	100.0	100.0
Wheat— Canada Other countries	1,000 bushels 15,700 0	1,000 bushels 21,429 1	1,000 bushels 12,948 0	1,000 bushels 19,058	100.0	100.0	100.0	100. 0
Total	15, 706	21, 430	12, 948	19, 054	100, 0	100.0	100.0	100.0

<sup>&</sup>lt;sup>2</sup> Boxes of 74 pounds net.

Table 444.—Principal agricultural products imported into the United States, by countries, 1927-28 to 1930-31—Continued

		~ ~ ~ ~ ~ ~	Year	heginning	July		- <del></del>	
Article and country from which imported		Quar	ntity			Per cen	t of tots	<u> </u>
	1927-28	1928-29	1929-30	1930-31	1927-28	1928-29	tt   cent   1930-31	
VEGLIABIL PRODUCTS contd.								
Grains, flours, etc. Continued. Wheat flour - Canada Ecuador United Kingdom Other countries	1,000 barrels 3 2 0 1	1,000 barrels 2 0 0 1	1,000 barrels 1 0 1 0	1,000 barrels 1 0 0 0	Per cent 50. 0 33. 3 0 16. 7	Per cent 66, 7 0 0 33. 3	cent 50 0 0 50.0	Per cent 100 0 0 0
Total	6	3	2	1	100.0	100. 0	100.0	100 0
Nuts: Almonds, shelled— Spain. Italy France Other Europe	1,000 pounds 9,637 7,703 306 197	1,000 pounds 10,399 6,578 286 273	1,000 pounds 8,902 8,912 136 118	1,000 pounds 6, 432 6, 348 223 61	Per cent 52. 8 42. 2 1. 7 1. 0	Per cent 57. 4 36. 3 1. 6 1. 6	cent 48. 6 48. 7	Pcr cent 48. 6 47. 9 1. 7
Total Europe	17, 843 414	17, 536 570	18, 068 236	13, 064 177	97. 7 2. 3	96. 9 3. 1	98.7 1.3	98, 7 1. 3
Total	18, 257	18, 106	18, 304	13, 241	100.0	100. 0	100.0	100. 0
Almonds, not shelled— Span France Italy Other Europe	229 131 98 5	1, 068 474 73 207	4, 530 518 375 61	3 54 18 0	49, 4 28, 2 21, 1 1, 1	56. 5 25. 1 3. 9 14. 0	9. 4 6. 8	3. 9 69. 2 23. 1 0
Total Europe Other countries	463 1	1,882 9	5, 484 19	75 3	99.8 .2	90. 5 . 5	99. 7 . 3	96. 2 3. 8
Total	464	1,891	5, 503	78	100, 0	100.0	100. 0	100.0
Filberts, shelled — Turkey in Europe France	2, 559 1, 206 329 447	(8) 1,027 1,764 984	(*) 178 2, 888 826	( <sup>8</sup> ) 334 37 797	38. 8 18. 3 5. 0 6. 7	(4) 18. 3 31. 5 17. 5	64.1	(i) 7.3 .8 17.3
Total Europe Turkey in Assa Other countries Total	4, 541 2, 059 0 6, 600	3, 775 4 1, 800 31 5, 606	3, 892 4 609 2 4, 503	1, 168 4 3, 417 11 4, 506	68. 8 31. 2 0 100. 0	67. 3 4 32. 1 . 6 100. 0	4 13. 5 100. 0	25. 4 4 74. 3 . 3 100. 0
Filberts, not shelled - Italy	6, 657 1, 936 1, 211 1, 269	11,053 818 (4) 213	4, 548 954 (4) 254	3, 987 423 (4) 229	59. 5 17. 2 10. 8 11. 2	91. 1 6. 7 (¹) 2. 0	79. 2 16. 6 (1) 4. 2	70. 5 7. 5 (3) 4. 0
Total Europe Turkey in Asia Other countrie	11, 103 51 87	12, 114 4 20 0	5, 756 4 0 0	4, 639 4 820 200	98. 7 . 5 . 8	90.8 4.2 0		82.0 4 11.6 3.5
Total	11, 214	12, 131	5, 756	5, 659	100.0	100. 0	100.0	100.0
Peanuts, shelled - Clima Other countries	49, 986 4, 798	23, 957 2, 619	7, 140 861	4, 959 441	91. 2 8. 8	90. 2 9. 8	89. 2 10. 8	91. 9 8. 1
Total	54, 784	26, 606	8, 001	5, 430	100.0	100.0	100.0	100.0
Peanuts, not shelled— Chuna Japan, incl. Chosen Philippine Islands Other countries	12, 839 509 0 650	4, 650 300 0 669	2, 445 212 351 253	3, 483 343 1, 075 457	91. 4 3. 8 0 4. 8	82, 0 6, 3 0 11, 7	75. 0 6. 5 10. 8 7. 7	65. 0 6 4 20 1 5. 5
Total	13, 498	5, 700	3, 261	5, 358	100.0	100, 0	100.0	100.0

Included with "Turkey in Asia."

Includes "Turkey in Europe."

Table 444.—Principal agricultural products imported into the United States, by countries, 1927-28 to 1930-31—Continued

	1		Year	r beginnin	g July			
Article and country from which imported		Qua	ntity			Per cer	it of tot	al
	1927-28	1929-29	1929-30	1930-31	1927-28	1928-29	Per Per Per ent cent 65.7 (1.1.4 4.2 13.2 69.9 1929-30 1900-0 19	1930-31
VEGETABLE PRODUCTS—contd.								
Nuts—Continued. Walnuts, shelled— France Other Europe	1,000 pounds 12,551 989	1,000 pounds 9,308 2,033	1,000 pounds 11, 357 722	1,000 pounds 4, 679 2, 090	Per ceut 78. 4 6. 1	Per cent 51. 8 11. 4	65. 7	Per cent 28.7 12.8
Total Europe China Other countries	13, 540 1, 952 523	11, 341 5, 052 1, 563	12, 079 4, 364 835	6, 769 8, 216 1, 341	84. 5 12. 2 3. 3	63. 2 28. 1 8. 7	25.3	41. 5 50. 3 8. 2
Total	16, 015	17, 956	17, 278	16, 326	100.0	100. 0	100.0	100.0
Walnuts, not shelled— Italy France Other Europe	4, 559 2, 244 144	4, 501 2, 720 3, 336	4, 620 831 117	2, 356 477 99	44. 2 21. 8 1. 3	28. 9 17. 5 21. 4	11.8	66. 3 13. 4 2. 8
Total Europe China Other countries	6, 946 2, 531 837	10, 557 4, 575 449	5, 568 1, 419 37	2, 932 504 116	67. 3 21. 5 8. 2	67. 8 29. 4 2. 8	20, 2	82. 5 14. 2 3. 3
Total	10, 314	15, 581	7, 024	3, 552	100.0	100. 0	100.0	100.0
Oils, vegetable: Coconut oil, product of Philip- pine Islands	273, 309	377, 288	370, 600	315, 942	100. 0	100. 0	100. 0	100. 0
Olive oil, edible— Italy————————————————————————————————————	45, 145 17, 797 5, 335 934	62, 202 16, 910 6, 182 1, 527	71, 265 20, 909 2, 959 710	45, 661 23, 675 2, 335 542	64. 4 25. 4 7. 6 1. 3	70. 6 19. 2 7. 0 1. 7	21. 2 3. 0	61.9 32.1 3.2 .7
Total EuropeOther countries	69, 231 899	86, 821 1, 297	95, 843 2, 603	72, 213 1, 581	98. 7 1. 3	98. 5 1. 5		97. 9 2. 1
Total	70, 130	88, 118	98, 446	78, 794	100.0	100.0	100.0	100.0
Soybean oil— Kwantung China Japan Other countries	13, 546 891 41 84	11, 089 1, 520 1, 729 2, 834	12, 867 0 121 345	5, 769 0 1 145	93. 0 6. 1 . 3 . 6	64. 6 8. 9 10 1 16. 4	0.9	97. 5 0 0 2. 5
Total	14, 562	17, 172	13, 332	5, 915	100.0	100.0	100. 0	100.0
Oilseeds: Copra, not prepared— Philippine Islands British Malaya French Oceania British Oceania Australia Other countries	336, 920 40, 381 25, 273 19, 941 17, 445 16, 198	386, 567 84, 700 21, 306 37, 685 55, 9\8 43, 691	299, 193 42, 114 22, 662 43, 778 35, 455 50, 254	311, 781 57, 619 21, 482 48, 774 30, 077 95, 664	73. 9 8. 9 5. 5 4. 4 3. 8 3. 5	61. 4 13 4 3. 4 6. 0 8. 9 6. 9	8. 5 4. 6 8. 9 7. 2	55. 1 10. 2 3. 8 8. 6 5. 3 17. 0
Total	456, 158	629, 937	493, 456	565, 397	100.0	100.0	100.0	100.0
Flauseed— Argentina Canada Other countries	1,000 bushels 16,057 1,933 122	1,000 bushels 20,927 2,528 39	1,000 bushels 19, 236 355 61	1,000 bushels 6, 102 1,490 221	88. 7 10. 7 . 6	89. 1 10. 8 . 1	97. 9 1. 8 . 3	78. 1 19. 1 2. 8
Total	18, 112	23, 494	19, 652	7, 813	100.0	100.0	100.0	100.0
Seeds, except oilseeds: Clover seed— Clover, red— Poland and Danzig Russia in Europe Germany France Other Europe.	1,000 pounds 2,015 1,328 697 493 855	1,000 pounds 1,278 202 679 3,664 1,578	1,000 pounds 1,141 88 283 845 0	1,000 pounds 0 0 0 2,249	37. 1 24. 4 12. 8 9. 1 15. 8	16 9 2 7 9.0 48.5 20.9	48. 4 3. 7 12. 0 35. 9 0	0 0 0 100.0
Total Europe Other countries	5, 388 46	7, 401 151	2, 357 0	2, 249 0	99. 2	98. 0 2. 0	100.0	100.0
Total	5, 434	7, 552	2, 357	2, 249	100. 0	100.0	100.0	100.0

Table 444.—Principal agricultural products imported into the United States, by countries, 1927-28 to 1930-31—Continued

			Year	beginning	July			
Article and country from which imported		Qua	ntity			Per cen	t of tote	ıl
	1927-28	1928-29	1929-30	1930-31	1927–28	1928-29	1929-30	1930-31
VEGETABLE PRODUCTS—contd.								
Seeds, except oilseeds—Contd. Clover seed—Continued. All other, including alsike, crimson, and all other clover— Poland and Danzig— Germany— France— Hungary—Other Europe—	1,000 pounds 964 799 791 485 221	1,000 pounds 957 1,651 2,750 372 303	1,000 pounds 963 2,149 1,546 280	1,000 pounds 330 686 1,450 1,510	Pcr cent 5. 9 4. 9 4. 8 3. 0 1. 3	Per cent 6.4 11.0 18.4 2.5 2.1	Per cent 7.4 16.5 4.5 11.8 2.2	Per cent 7. 8 16. 3 34. 5 35. 9 3. 1
Total Europe Canada Other countries	3, 260 13, 121 16	6,033 8,809 12	5, 533 7, 515 0	4, 105 95 8	19. 9 80. 0	40. 4 59. 5	42.4 57.6	97.6 2.3
							<u> </u>	
TotalSpices:	16, 397	14,944	13,048	4, 208	100.0	100.0	100.0	100.0
Pepper, unground— United Kingdom British India Dutch East Indies British Maloya Other countries	5, 292 7, 907 6, 446 2, 831 1, 502	3, 435 6, 218 9, 205 1, 469 5, 336	3, 238 7, 505 17, 250 870 2, 125	1, 499 6, 995 19, 351 1, 409 2, 045	22, 1 32, 9 26, 9 11, 8 6, 3	13. 4 24. 2 35. 9 5. 7 20. 8	10. 4 24. 2 55. 7 2. 8 6. 9	4.8 22.3 61.8 4.5 6.6
Total	23, 978	25, 663	30, 988	31, 299	100.0	100.0	100.0	100.0
Sugar, raw, cane:  &uba Philippine Islands Other countries	1,000 short tons 3, 399 613 33	1,000 short tons 4, 109 605 38	1,000 short tons 2,769 809 63	1,000 short tons 3, 010 254 24	84.0 15.2 .8	86. 5 12. 7 . 8	76. 1 22. 2 1. 7	91. 5 7. 7 . 8
Total	4, 045	4,752	3, 641	3, 288	100.0	100.0	100.0	100.0
Tea: United Kingdom Japan. Ceylon. China. British India. Dutch East Indies Other countries	1,000 lbs. 20, 380 25, 399 16, 326 10, 131 9, 198 5, 398 3, 267	1,000 lbs. 23,608 27,329 16,893 8,878 7,688 5,358 2,881	1,000 lbs. 21, 578 22, 048 19, 047 7, 405 9, 217 4, 891 2, 182	1,000 lbs. 23, 310 21, 416 16, 895 6, 704 10, 613 5, 184 3, 027	22.6 28.2 18.1 11.1 10.2 6.0 3.8	25. 5 29. 5 18. 2 9. 6 8. 3 5. 8 3. 1	25. 0 25. 5 22. 1 8. 6 10. 7 5. 7 2. 4	26. 7 24. 6 19. 4 7. 7 12. 2 5. 9 3. 5
Total	90, 009	92, 635	86, 368	87, 148	100.0	100.0	100.0	100, 0
Tobacco, leaf, unmanufactured: Leaf, product of Philippine Islands	2, 541	4, 678	4, 007	4, 278	100.0	100. 0	100.0	100.0
Leaf, for cigar wrappers— Netherlands———— Other countries————————————————————————————————————	6, 218 126	6, 095 117	8, 415 126	2, 988 51	98. 0 2. 0	98. 1 1. 9	98. 5 1. 5	98. 3 1. 7
Total	6, 344	6, 212	8, 541	3, 039	100.0	100.0	100.0	100.0
All other leaf— Greece——————————————————————————————————	17, 289	16, 741 11, 286 305 22, 116 14, 269 1, 284	13, 400 6, 563 391 21, 773 6, 162	18, 913 12, 124 71 18, 290 12, 974	22. 3 19. 6 1. 8 30. 7 24. 6	25. 4 17. 1 . 5 33. 5 21. 6 1. 9	27. 7 13. 6 .8 45. 0 12. 7	30. 2 19. 3 . 1 29. 2 20. 7
Other countries	720	66, 001	48, 376	284 62, 665	1.0	100.0	100.0	100.0
India rubber, crude: United Kingdom British Malaya. Dutch East Indies. Caylon. Other countries.	110, 575 521, 634 170, 161 73, 542 46, 923	50, 938 811, 843 215, 863 112, 257 36, 028	7, 249 788, 594 195, 297 118, 425 27, 841	27, 970 733, 419 164, 690 86, 985 19, 134	11. 9 56. 7 18. 4 7. 9 5. 1	4. 2 66. 2 17. 6 9. 1 2. 9	.6 69.3 17.2 10.4 2.5	2.7 71.1 16.0 8.4
		1, 226, 929		1, 032, 198	100.0	100. 0		100.0
Total	020, 010	1, 220, 929	1, 101, 100	1, 002, 180	120.0	100.0	1 200.0	1000

Bureau of Agricultural Economics. Compiled from Monthly Summary of Foreign Commerce of the United States, June issues, 1929–1931, and official records of the Bureau of Foreign and Domestic Commerce.

Table 445 .- Vegetable oils: Exports from the United States, 1909-10 to 1930-31

Year beginning July—	Corn	Cotton- seed	Linseed	Cocoa butter or but- terine	Coconut	Peanut	Soybean
1903-10 1910-11 1911-12 1912-13 1913-14 1914-15 1918-16 1916-17 1917-18 1918-19 1918-19 1919-20 1920-21 1921-22 1922-23 1922-24 1924-25 1925-26 1926-27 1927-28 1929-30 1929-30 1929-30	18, 262 17, 790 8, 968 8, 780 1, 331 1, 085 12, 483 6, 919 5, 224 4, 196 3, 586 2, 927 405 329 323	1,000 pounds 223,521 399,471 315,233 192,963 318,367 266,512 158,912 100,780 283,268 91,615 64,292 39,418 55,261 59,015 57,580 61,470 29,531 31,998 26,353	1,000 gallons 128 247 1,734 1,212 714 1,202 1,188 561 368 414 330 320 311 311 311 311 317 320 320 321 321 321 321 321 321 321 321 321 321			1,000 pounds	

Bureau of Agricultural Economics. Compiled from Foreign Commerce and Navigation of the United States, 1910-1918; Montly Summary of Foreign Commerce of the United States, June issues, 1919-1931.

Table 446.—Vegetable oils: Imports into the United States, 1909-10 to 1930-31

$\begin{array}{c ccccccccccccccccccccccccccccccccccc$													
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Year beginning July—		nese	butter or but-		ton-		Olive	Palm	ker-			
	1910-11 1911-12 1912-13 1913-14 1913-15 1915-16 1915-16 1915-16 1915-19 1916-17 1917-18 1916-19 1919-20 1920-21 1922-22 1922-23 1922-23 1923-24 1923-27 1927-29 1928-29 1929-30	gals. 7 5 5 189 63 334 1,175 472 271 271 36 185 36 22 125 17	gals. 25,760 27,042 4,768 5,997 4,932 4,940 4,968 6,217 10,614 4,440 7,410 11,919 10,786 11,315 13,657 11,150 15,3657	7. 123 3. 100 4. 075 3. 603 2. 839 150 400 106 (9) 3. 420 915 7. 123 3. 010 1, 169 733 14 14 12 18 17 27 27 27	bs. 48, 348 51, 148 51, 148 66, 371 50, 504 74, 386 63, 135 66, 023 259, 195 344, 728 230, 236 212, 573 181, 230 250, 121 250, 878 284, 776, 233 370, 638	25s. (1) 1,513 3,384 17,293 15,162 17,181 13,703 14,291 20,410 24,165 1,315 (9) 45 (9) 283 6,396 1 (9) 2	gals. (?) 737 174 152 535 50 111 151 1997 22,494 7,508 3,145 2,21 177 46 890	gals. 4, 5454 5, 473 8, 840 6, 981 7, 364 8, 100 8, 184 2, 652 4, 308 7, 705 11, 112 15, 743 11, 18, 368 17, 964 15, 746 119, 706	bs. 92, 772 57, 100 47, 159 50, 229 58, 040 31, 486 40, 497 36, 074 27, 405 19, 281 50, 165 31, 076 39, 159 114, 387 114, 387 152, 254 110, 184 183, 977 228, 230 237, 860	lbs. (2)   25, 393   22, 589   34, 369   34, 906   6, 761   1, 857   19   1, 945   2, 769	gals. (1) 896 1,136 1,337 853 1,475 8,280 11,393 22,042 2,384 1,007 2,008 468 408 1,061 648 454	gals. 1,083 1,383 1,183 1,150 1,490 2,561 1,490 2,561 1,230 2,091 1,352 1,770 2,088 1,959 2,088 2,083 2,042 2,5152	bbs, (2) 28, 021 12, 340 19, 207 98, 120 102, 600 136, 525 236, 505 149, 331 8, 253 38, 631 17, 401 22, 553 14, 562 17, 173

Bureau of Agricultural Economics. Compiled from Foreign Commerce and Navigation of the United States 1910-1918: Monthly Summary of Foreign Commerce of the United States, June issues, 1919-1921.

<sup>1</sup> Included with "Other vegetable oils and fats."
3 Preliminary.

<sup>1</sup> Imports for consumption. (See introduction to Agricultural Statistics.)
2 Includes poanut oll.
3 Included in all other fixed or expressed.
4 Included in Chinese nut oll.

Includes hempseed.
Less thna 500 pounds.
Preliminary.

Table 447.—Oil cake and oil-cake meal: International trade, average 1925-1929, annual 1928—1930

				Calend	ar year			
Country	Average	1925–1929	19	28	19	29	198	3O 1
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
FRINCIPAL EXPORTING COUNTRIES United States Russia British India Egypt France	672, 830 584, 664 356, 706 336, 094	75, 294	699, 241 347, 802 438, 107	75, 411	705, 990 391, 092 360, 341	102, 373	614, 127 530, 085 503, 541 553, 794	0 177 0 90, 974
Ohina Italy Rumania	270, 571 242, 957 3 143, 450	603 2 9	324, 048		303, 662		134, 412	3, 665
Argentine Dutch East Indies Peru Brazil Canada Bulgaria Spain British Malaya Ohile Australia ' Latvia	139, 227 135, 473 70, 465 54, 650 45, 464	0 0 0 15, 863 10 3, 754 11, 530 1 2, 404	79, 042 44, 407 44, 419 46, 972 13, 898 18, 079 3, 780 5, 711	0 0 13, 930 0 5, 116 15, 770 0 6, 261	182, 958 66, 540 58, 633 51, 032 55, 701 10, 853 17, 183 5, 640 10, 210	0 0 0 21, 931 30 7, 545 16, 858 0 938	57, 387 35, 907 77, 575 5, 135 12, 311	16, 559 12, 572 11, 933
Total	4, 546, 162	306, 303	4, 180, 426	367, 824	4, 590, 703	484, 512	3, 714, 459	271, 096
PRINCIPAL I UPDETING COUNTRIES  Denmark Germany United Kingdom Netherlands Japan Belgium Sweden Finland Iriah Free State Czechoslovakia Switzerland Norwsy Poland Ceylon Austria	43, 218 83, 183 12, 655 0 54, 113 13, 977 984 28, 545 25, 251	346, 965 824, 674 305, 454 183, 687 111, 617 76, 079 75, 127 63, 263 56, 356 42, 090 31, 822	972, 716 208, 134 120, 920 58, 424 95, 929 9, 416 0 46, 186 17, 734 1 27, 397 32, 650	669, 165 353, 768 334, 711 311, 856 227, 575 106, 412 106, 306 75, 052 63, 481 84, 824 42, 636 45, 513	620, 202 160, 247 133, 907 78, 254 99, 879 18, 261 59, 654 12, 844 4, 730 35, 885 37, 344 1, 628	835, 947 310, 707 337, 025 290, 655 163, 685 108, 652 97, 314 69, 505 33, 812 69, 690 40, 190	594, 523 134, 227 141, 231 23, 276 81, 111 28, 194 16, 937 33, 686 31, 234 1, 002	992, 080 487, 119 321, 335 391, 617 307, 963 110, 229 199, 771 57, 948 49, 553 45, 522 35, 307
Hungary	15, 310		12, 043					

Bureau of Agricultural Economics. Official sources except as otherwise noted. The class called here "Oil cake and oil-cake meal" includes the edible cake and meal remaining after making oil from such products as cotton seed, flaxseed, peanuts, corn, etc. Soybean cake is not included in this table.

<sup>&</sup>lt;sup>1</sup> Preliminary.

<sup>&</sup>lt;sup>2</sup> 3-year average.

<sup>&</sup>lt;sup>3</sup> Java and Madura only

Year ending June 30

Table 450.—Tea: International trade, average 1925-1929, annual 1927-1930

				(	Dalenda	ryear				
Country	Ave 1925-		19	27	19	28	19	29	193	0 1
	Ex- ports	Im- ports	Ex- ports	Im- ports	Ey- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports
PRINCIPAL EXPORTING COUNTRIES British India	364, 848 228, 444 124, 947 116, 300 24, 631 20, 431	8, 260 1 8, 434 8, 214 1, 009 66	375, 949 227, 038 127, 292 114, 651 23, 487 22, 156	7, 839 2 7, 995 8, 809 882 83	pounds 364, 686 236, 719 135, 058 123, 150 24, 004 18, 893	10, 164 1 9, 339 13, 030 1, 027 71	388, 493 251, 490 139, 930 125, 695 23, 600 17, 668	8, 461 9, 123 5, 010 1, 244 92	243, 107 3116, 835 91, 358 20, 316	3 7, 800 3, 029 1, 152
COUNTRIES  United Kingdom. United States Anstralia 1 Russia. Canada Netherlands. Irish Free State Persia 4 Morocco New Zealand Union of South Afr.ca. Germany Egypt. British Malaya Chile. Indo-China Poland. Argentina. France Algeria Czechoslovakia. Denmark Austria. Yugoslavia. Hungary	0 0 0 0 29 9 0 218 259 1, 323 2, 164 2, 164 15 0 822 15 5	23, 220 14, 925 12, 770 11, 152 11, 122 11, 037 10, 814 10, 491 5, 156 4, 827 4, 428 3, 867 3, 140 1, 276 1, 286	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	33, 741 38, 117 27, 694 22, 667 13, 090 11, 333 11, 812 11, 409 8, 663 10, 778 4, 653 5, 071 4, 621 1, 409 1, 748 1, 758	0 0 0 266 0 161 0 291 1, 326 2, 065 2, 065	64, 590 39, 527 28, 186 22, 649 15, 662 11, 186 11, 186 14, 318 14, 318 15, 767 5, 025 4, 211 3, 35 2, 513 1, 597 1, 344 1, 902	0 0 0 40 506 201 0 248 1, 217 8 2, 232 69 2 11	23, 580 16, 280 16, 788 12, 061 12, 095 12, 723 13, 093 11, 378 5, 700 24, 313 4, 839 4, 213 3, 494 2, 650 1, 606 1, 267 1, 430	0 0 0 0 93 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	53, 411 50, 886 20, 587 23, 962 12, 088 10, 178 12, 332 13, 320 5 12, 200 4, 908 4, 533 3, 874 4, 908 4, 533 1, 278 2, 647
Total	4,860	814, 562	3, 992	820, 146	4, 199	831, 747	4, 678	883, 775	1, 247	790, 153

Bureau of Agricultural Economics. Official sources except where otherwise noted. These figures are for tea leaves only; tea dust and sweepings and yerbe maté are not included.

Preliminary.
 International Yearbook of Agricultural Statistics.
 Java and Madura only.

<sup>&</sup>lt;sup>4</sup> Year ending March 20 of following year. <sup>5</sup> Includes yerbe maté and imitation tea.

Table 451.—Copra and coconut oil: International trade, average 1925-1929, annual 1928-1930

COPRA

				Calend	ar year		<del></del>	
Country	Average	1925-1929	19	28	19	29	193	01
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Dutch East Indies Philippine Islands British Malaya Ceylon Fiji Solomon Islands <sup>2</sup> Mozambique Zanzibar Tonga Samoa, West Tanganyika Trinidad and Tobago Gilbert and Ellice Islands <sup>3</sup>	pounds 851, 367 409, 191 386, 704	pounds 6 1, 017 169, 135 502	pounds 971, 900 516, 795 409, 602	pounds 2, 273 195, 395 346	pounds 1, 007, 214 382, 658 444, 949	pounds 22 1, 975 192, 506	pounds 828, 306 384, 263 429, 417	pounds 409 964 200, 198
Fiji Solomon Islands <sup>2</sup> Mozambique	239, 555 62, 601 48, 372 40, 469	0		0	74, 426 47, 678 44, 124	0	53, 496	0 0 0
Zanzibar Tonga	36, 278 32, 048 30, 179 17, 685	11,050 0 0 0	34, 704 35, 103 35, 815	13, 740 0 0 0	37, 416 37, 769 28, 990 17, 441 23, 980	11, 367 0 0		10, 926 0 0 0
Trinidad and TobagoGilbert and Ellice Islands 3	16, 331 10, 482	1, 193 0	21, 352 10, 524	220	9, 233	2, 298 0		1,893
Total IMPORTING COUNTRIES			2, 434, 436 =====	211, 977	2, 384, 937	208, 824	1, 949, 052	214,390
United States Germany France Netherlands United Kingdom Denmark	0 777 145 791 0	469, 115 442, 523 364, 155 308, 530 124, 434 122, 840	0 16 40 689 0	501, 990 442, 593 405, 174 802, 201 89, 484 133, 386	1, 544 628 1, 617 0	570, 913 539, 130 421, 130 309, 245 147, 403 154, 339	l U	595, 338 332, 356 437, 616 213, 463 150, 830 154, 088
United States Germany France Netherlands United Kingdom Denmark Australia  Italy Norway Austria Sweden Belgium Latvia British India	0 9 0 6 0 113 0	71, 419 61, 352 43, 568 28, 765 24, 518 18, 169 3, 496 2, 926	0 5 0 0 101 0 226	66, 238 58, 516 45, 994 29, 639 21, 462 13, 628 3, 655 3, 736	0 8 0 0 50 50 271	24,009	0 11 0 0 0 37 0 204	27, 568 8, 758 18, 010 5, 121
Total	3, 125	2, 085, 810		2, 117, 696		2, 402, 430		2, 085, 553
		COC	опит с	IL				
PRINCIPAL EXPORTING COUNTRIES Philipping Telords	308, 196	0	313, 589	0	420, 019	0	204 880	
Philippine Islands Netherlands Ceylon Dutch East Indies Germany France British India Australia 2	121, 614 78, 807 42, 689 33, 181 29, 644 20, 223 398	9, 639 13, 10, 582 11, 254 10, 076 58 250	124, 479 87 261	3, 199 10 9, 342 13, 791 7, 276 13 214	134, 128	9, 674	99, 333 85, 543 31, 904 25, 874 24, 922 21, 217	11,496 18,942 10,956
Total PRINCIPAL IMPORTING	634,752	41, 852	692, 552	33, 845	837, 726	53, 711	613, 673	44, 513
United States United Kingdom Belgium 4 Sweden Denmark British India Egypt Italy 4 Rumania New Zealand Canada Portuguese India 3	21, 691 7, 473 5, 924 3, 365 25, 414 1, 037	294, 849 105, 560 34, 156 32, 563 27, 069 12, 054 11, 470 8, 724 5 1, 553	33, 420 709	290, 637 141, 142 34, 017 37, 497 23, 531 21, 014 11, 502 12, 338	7, 619 1, 118 42, 820 812	39, 751 45, 607 21, 834 16, 858 12, 675	1, 590 44, 878 433	46, 492 15, 699 8, 217 5, 786
New Zealand Canada Portuguese India <sup>3</sup>	000	896 739	0	656		1, 891	0	
Total	65, 011	529, 683	77,416	573, 156	92, 712	707, 209	79, 719	517, 324

Bureau of Agricultural Economics. Official sources except where otherwise noted.

<sup>1</sup> Preliminary.
2 International Yearbook of Agricultural Statistics.

<sup>Year ending June 30.
Includes some other oils.</sup> 

<sup>&</sup>lt;sup>5</sup> 3-year average.

## FARM BUSINESS AND RELATED STATISTICS

Table 452.—Crop summary: Acreage, production, and yield per acre, 1929-1931

_		Acreage			Produ	ction		Yield	l per acr	9
Crop	1929	1930	1931	Unit	1929	1930	1931	1929	1930	1931
	1,600	1,000	1,000		Thou-	Thou-	Thou-			
Com	97.806	acres 100, 743	acres 104, 970	Bushel	sands 2, 535, 386	sands 2, 060, 185	sands 2, 556, 863	25. 9	20. 4	24. 4
CornAll wheatOatsBarley	62, 671	61, 138	54, 949 89, 722	do	812, 578 1, 118, 414 280, 242	2, 060, 185 858, 160 1, 277, 764 304, 601	892, 271	13.0	14.0	16. 2 28. 0
Oats	38, 148	39, 729	89, 722	do	1, 118, 414	1, 277, 764	1, 112, 142	29.3	32. 2	28.0
Barley	13, 523 3, 054	2 543	11, 471 3, 143	qo	280, 242 34, 950	45, 379	1, 112, 142 198, 965 32, 746	20.7 11.4	24. 1 12. 8	17. 3 10. 4
Buckwheat	627	ı <i>Di</i> ai	502	do.	8, 692	6, 962	8, 875	13. 9	12. 2	17. 7
Rye	3,047	3, 732 959	2, 313	do	15, 910	6, 962 21, 240	8, 875 11, 018 45, 014	5. 2	12. 2 5. 7	4. 8 46. 4
Rice (4 States)	860	959	970	1. 40	40, 604	44, 299	45, 014	47. 2	46. 2	46. 4
Grain sorghums Hay, tame Hay, wild	6, 131 55, 019	6, 586 52, 622	7, 152 53, 449	do Ton	81, 041 76, 114	64, 416 63, 463	104, 529 64, 233	13. 2 1. 38	9. 8 1. 21	14. 6 1. 2
Hay, wild	13, 586	13, 793	11, 977	do	11, 194	10, 751	8, 133	82	78	. 68
All hay Sweet sorghum	68, 605	66, 415	65, 426	do	87, 308	10, 751 74, 214	72, 366	1. 27	. 78 1. 12	. 68 1, 11
Sweet sorghum										
(forage and hay)1	1,850	1, 818	0 999	do	3, 253	2,760	3, 676	1,76	1, 52	1. 5
Clover seed (red		1 ' 1	4, 000		0, 200	2, 100	2,070	1. 10	1, 02	1. 04
Clover seed (red and alsike)	1,789	1, 076	885	Bushel	2, 627	1, 523	1, 222	1, 47	1. 42	1. 3
Sweet clover seed	276	219	218	do	1, 167	848	760	4. 24	3. 88	3. 4
Lespedeza seed Alfalfa seed	52 401		56 354	do	199 982	128	238 853	3. 78	3. 07 2. 73	4.2
Timothy seed	407		483	do	1 379	1, 145 1, 740 13, 759 15, 416	2 04A	2. 45 3. 39	4. OR	2.4 4.2
Timothy seed Beans, dry edible Soybeans 4 Cowpens 4 Velvet beans Peanuts Potatoes Sweetpotatoes Tobacco Cotton Cottonseed Broomoorn Hops Pecans	1.836	2,091	1,860	Bag 2	1, 378 12, 240	13, 759	2, 046 12, 705 18, 885	8 11. 2	3 11. 0	3 11. 5
Soybeans 4	886	1, 162	1. 271	Bushel	11. 944	15, 416	18, 885	13. 5	3 11. 0 13. 3	14.9
Cowpeas 4	611	674	1, 016	do			I III.4hX	9.0	8.8	10.3
Pegnite	1,219	1, 201 1, 862	1,044	Ton Pound Bushel do Pound	1 941 416	470	1 554 410	5 891 670	5 783 632	8 732 716
Potatoes	2,978	3, 038	2, 172 3, 382	Bushel	329, 134	1, 176, 700 333, 210	1, 554, 410 376, 248 62, 904 1, 610, 098	110.5	109.7	111.3
Sweetpotatoes	646	648	778	do	64, 963	53, 663	62, 904	100.6	82, 8	80.9
Tobacco	1, 987	2, 101	2,020				1, 610, 098	774	778	797
Cotton	45, 793	45, 091	40, 495	Bale	14, 828	13.932	I TO ATR	8 155. O	5 147.7	<sup>5</sup> 200. 1
Broomcorn	810	391	309	Ton	6, 590 47	6, 185 50	7, 523 48	<sup>5</sup> 305	<sup>6</sup> 255	5 310
Hops	24	20	21	Pound.	33, 195	23, 447	OK OKO	11 000	1, 202	1, 208
Pecans					51, 388	46,469	74, 985			
Sugar bects	688	775	720	Ton	7, 315	9, 199	7, 933	10.6	11. 9	11.0
Canasirun	180	187	188	do Gallon	3, 423 19, 335	18 004	2,760	18. 4 185. 9	16. 6 161. 9	14.7 142.9
Sorgo sirup	150	165	259	do	9, 256	8, 916	17, 818	61.7	54. 0	68. 8
Sugar bects	6 12, 906	6 13, 113	6 12, 218	Pound	1, 344	2,430	1, 653	7.10	7.19 7.28	7.14
Maple sirup	6 12, 906	6 13, 113	<sup>5</sup> 12, 218	Gallon	2, 346	3, 635	2, 157	7.10 7.18	7.28	7.14
Fruit crops:				Bushel	135, 622	155, 982				
Apples, com-				Posner-	130, 022	100, 982	211, 506			
Apples, total Apples, com- mercial				Barrel	28, 843	33, 668	34, 732			
Peaches, total				Bushel	45, 026	8 53, 884	84, 732 8 77, 743			
Cropper total				do	21, 172	8 25, 540 8 2, 439	° 23, 009			
Cherries (10				Ton	2, 080	° 2, 439	8 1, 583			
Apples, com- mercial  Peaches, total  Pears, total  Grapes, total  Cherries (10  States)	l			do	93	115	108			
Plums and prunes fresh (4										
prunes iresh (4				do		***				
States) Prunes, dried		i		ao	117	148	<sup>8</sup> 118			
(4 States)				do	161	8 296	204			
Oranges (7 States)		1								
Grapefruit (4				Box	34, 034	54, 559	50, 814			
States)				do	11, 095	18, 690	14 770			
States) Lemons (Calif.) Cranberries				do	5, 900	7, 950	14,770 8,000			
Cranberries	29	28	28	Barrel	549	560	651	19, 2	20. 2	23. 5
Commercial truck										
crops: Artichokes	9	8	8	Bor	000	1 011	646		104	400
Asparagus 10	92		103	Box Crate	988 0 472	1, 011 10, 524	818 9, 307	111 103	124 108	109 91
Beans, Lima	5	10	8	Bushel	9, 472 348	587	9, 507 549	75	59	66
Asparagus <sup>10</sup> Beans, Lima Beans, snap <sup>10</sup>	159	189	168	Ton	200	214	184	1, 25	1, 13	1.10
Beets	9	10	.11	Bushel	1 445	1, 903	2, 434	164	192	223
Cantalounes	143 109	149 129	146 138	Ton	1,036	998	993	7. 25	6. 70	6.8
Beets Cabbage 16 Cantaloupes Carrots 16 Cauliflower Callery	27	28	30 1991	Orate Bushel	1, 036 17, 393 10, 225	15, 951 10, 662	17, 962 11, 833	160 383	123 381	130 390
A	25 32	28	30 28	Crate	6, 797 9, 418	5, 843	7, 087	271	212	254
Celery	20					10, 410				

See footnotes at end of table.

Table 452.—Crop summary: Acreage, production, and yield per acre, 1929-1931— Continued

		Acreage			Produ	ction		Yield	i per acr	8
Crop	1929	1930	1931	Unit	1929	1930	1931	1929	1930	1931
Corn, sweet 11 Cucumbers 10 Eggplant. Kale. Lettuce. Onions. Peass green 10 Peppers. Pimientos. Polatoes, early. Spinach 10 Tomatoes 10 Tomatoes 10 Watermelons. Total truck crops (except potatoes). For market (except potatoes). For manufacture.	1,000 acres 379 122 3 2 139 87 301 15 5 9 269 68 203 461 217 2,616 1,460 1,147	174 4 2 173 83 348 17 9 9 325 56 178 560 235	1,000 acres 374 138 4 4 2 177 77 309 19 57 347 57 154 448 239 2,678 1,606 1,072	Busheldodo Crate Bushel Ton Bushel Ton Crate 12. Ton Number.	Thou- sands 743 8, 685 8100 20, 220 25, 489 244 3, 425 19, 350 34, 839 247 70, 056	798 738 19, 591 26, 002 354 3, 690	10, 757 775 480	1. 96 71 232 450 145 292 . 98 222 2. 15 130 3. 62 67. 9 4. 30 323	80 222 410 113 313 1.02 213 1.72 134 2.72 54.2	78 207 200 105 246 . 80 248 1. 37 134 2. 99 73. 1
Total all crops with duplica- tions elimina- ted	357, 827	359, 927	350, 672							

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

1 Not included in tame hay.

2 100-pound bags. 3 Bushels of 60 lbs.

f Trees tapped.

Total except hay. Pounds.

7 Per tree.

For tree.

Includes some quantities not harvested.

Production is the total for fresh fruit, juice, and raisins.

Includes production used for canning or manufacture.

Mainly for canning but includes also market for New Jersey.

12 Crates containing 24 quarts.

Table 453.—Indexes of the volume of net agricultural production, 1919-1931 [1919-1927=100]

Year	Grains	Fruits and vege- tables	Truck crops	Meat animals	Dairy products	Poultry products	Cotton and cot- tonseed	Total
1919. 1920. 1921. 1922. 1923. 1924. 1925. 1926. 1927. 1929. 1929. 1930. 1931.	Index no. 101 116 100 97 100 95 93 97 106 87 85 85	Index no. 82 102 76 109 108 106 98 116 104 122 102 112 116	Index no. 71 86 74 101 99 111 115 114 129 124 141 137	Index no. 96 92 91 107 108 102 103 105 105 99 100	Index no. 81 80 91 95 103 109 110 114 118 119 122 122 122	Index no. 85 84 95 98 107 100 104 111 116 112 116 119 121	Index no. 91 105 64 777 80 108 128 143 108 114 118 113	Index no. 91 97 87 96 1011 108 111 109 107 111

Bureau of Agricultural Economics.

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1 These indexes are based on estimates of production for sale and for consumption in the farm home. Production fed to livestock or used for seed is not included. For example, instead of total production, only the amounts of corn and cets shipped out of county where grown and only a small percentage of the hay crops are included. The index of dairy products represents total milk production for all purposes. Production of meat animals is represented by total slaughter, including slaughter for farm use. Calendar-year production of livestock and livestock products are here compared with crop production of the same year. Each group index as well as the total is obtained by multiplying the yearly quantities by a 1919-1927 average farm price received by producers for each of the commodities, and the sum of these yearly values at average prices, divided by the corresponding average sum for the period 1919-1927, taken as 100. The following commodities included in the index contribute about 90 per cent of the gross income from agricultural production: Grains—wheat, corn, cats, barley, rye, buckwheat, kafir, rice; fruits and vegetables—grapes, apples, apricots, peaches, pears, crunberries, figs, grapefrult, lemons, olives, oranges, potatoes, sweetpotatos, dry odible beans; truck crops—asparagus, snap beans, cabbage, cantaloupes, cauliflower, celery, oncumbers, lettuce, onions, peas, spinach, strawberries, tomatoes, watermelons; meat animals—cattle, calves, sheep, lambs, hogs; dairy products—milk total production; poultry products—chickens and eggs; cotton and cottonseed; total includes also tobacco, wool, and hay.

2 Preliminary.

Table 454.—Acreage of 52 crops and value of 75 crops, by States, 1929, 1930, and 1931

	Acr	eage of 52 o	rops	Va	lue of 75 crop	)S 1
State and division	1929	1930	1931	1929	1930	1931
Maine	1, 354	1, 336	1, 332	1,000 dollars 79, 077	45,804	1,000 dollars 24,013
Maine New Hampshire	392	383	377	9, 447	8, 997	6, 667 17, 733 19, 382
Vermont Massachusetts	1,078 440	1,062 425	1,067 421	23, 672 28, 862	22, 207 24, 787	17, 733
Rhode Island	51	49	48	2, 608	2, 320	19,382
Connecticut	364	357	347	27, 130	2, 320 25, 440	1, 665 17, 261
New York	6, 727	6, 524	6, 496	195, 997	179, 748	126.065
New Jersey Pennsylvania	711 6, 299	707 6, 263	694 6, 219	51, 024 184, 702	50, 214 162, 557	34, 068 123, 795
North Atlantic	17, 415	17, 106	17, 001	602, 519	522, 083	370, 649
Ohio	9,760	9, 708 10, 264	9, 975	228, 323	167, 371	145, 100 100, 649
Indiana Hinoig	10, 088 18, 477	18, 529	10, 572 18, 716	201, 512 386, 840	153, 970 272, 949	100,649
Illinois Michigan Wisconsin	7 207 1	7, 371	7, 444 9, 484 18, 703 22, 168 13, 366	169, 884	145, 755	195, 585
Wisconsin.	9, 506 18, 274 22, 203 12, 960 21, 724	7, 371 9, 572 18, 376	9, 484	169, 884 225, 548	198,897	97, 826 121, 778
Minnesota	18, 274	18, 376	18, 703	311, 976 501, 571	231, 340	146,761
Iowa	12,203	12,430	12, 168	501, 571	372, 138	224, 513
North Dakota	21, 724	21, 287	15, 624	226, 008 188, 758	148, 872 121, 507	126, 958
Missouri North Dakota South Dakota	17, 682 21, 345	18, 220	14, 850	186, 572	116, 662	52,484 41,728
Nebraska	21, 345	22, 430 13, 197 21, 287 18, 220 21, 908	21, 880	186, 572 328, 350 307, 222	244, 589	140, 946
Kansas	24, 145	24, 600	25, 058	307, 222	199, 936	163, 072
North Central	193, 471	195, 462	187, 838	3, 262, 564	2, 373, 986	1, 566, 401
Delaware	383	386	385	14, 617	11,012	8, 414
Maryland	1,691	1, 673	1, 672	62, 590	41,072	39, 480
Virginia West Virginia	3,752 1,478	3, 671 1, 373	3, 834 1, 448	145, 383	84, 620	78, 263
North Carolina	6, 241	6, 364	6, 378	257 O55	25, 569	27, 043
North Carolina South Carolina	4, 672	4,771	4, 731	141, 068	213, 647 118, 993	136, 496 71, 438
Georgia	9, 461	9, 453	9, 558	228, 978	179, 422	101, 898
Florida	1, 379	1,419	1, 487	62, 590 145, 383 43, 138 257, 955 141, 068 228, 978 111, 590	124, 482	86, 485
South Atlantic	29, 057	29, 110	29, 493	1, 005, 319	798, 817	549, 517
Kentucky	5, 204	4, 966	5, 340	172, 212 179, 222 194, 099 252, 167 204, 289	97, 616	102 497
Tennessee	6,048	5, 985	6, 151	179, 222	112, 079	89, 691
Mississinni	7, 568 6, 756	7, 945 6, 787	8, 143	194, 099	97, 616 112, 079 139, 392 129, 209 84, 681	102, 497 89, 691 88, 908
Arkansas	6,866	6, 874	7, 008 6, 927	202, 107	129, 209	97, 913
Louisiana	4, 471	4, 428	4, 451	154, 678	101, 616	107, 844
	15, 552	14, 938	15, 622	154, 678 242, 316 595, 690	126, 613 410, 992	81, 883 108, 328
Texas	31, 398	31, 765	32, 442	595, 690	410, 992	304, 659
South Central	83, 863	83, 688	86, 084	1, 994, 673	1, 202, 198	981, 7 <b>23</b>
Montana	7,755	7, 759	4, 944	88, 635	57, 858	32. 751
Idaho	3, 024	3, 012 (	2, 851	99,610	74, 959	32, 751 49, 076 16, 967
Wyoming Colorado New Mexico	1, 993 6, 640	2, 044 7, 046	1, 784	33, 159 (	26, 951	16, 967
New Mexico.	1, 460	1, 378	6, 563 1, 531	130, 676 35, 243	120, 717	61, 081 18, 150
Allzona	483	516	480	39, 990	19, 955 27, 443	18, 150 16, 516
Utah	1, 122	1, 171	1, 115	33, 263	26, 873	20, 027
Nevada	393	393	240	9,991	6, 506	3, 152
	3, 442 2, 679	3, 479 2, 644	3, 575	143, 368	102, 141	70, 070
California	5, 029	5, 119	2, 577 4, 596	80, 278 520, 206	60, 047 398, 315	44, 694 316, 076
Western	34, 020	34, 561	30, 256	1, 223, 419	921, 765	654, 560
United States	357, 827	359, 927	350, 672	8, 088, 494	5, 818, 849	4, 122, 850

<sup>&</sup>lt;sup>1</sup> Values are based upon Dec. 1 prices or seasonal prices to December and differ from prices used in Tables 455 and 456.

Table 455.—Farm value, gross income, and cash income from farm production, average, 1924–1928 and 1930

		Farm v	alue 1			Gross in	come 2	
State	Oro	ps	Livesto livestock		Cro	ps	Livesto livestock	
	Average, 1924–1928	1930	Average, 1924–1928	1930	Average, 1924–1928	1930	Average, 1924–1928	1930
	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Maine	dollars 76, 366	dollars	dollars	dollars	dollars	dollars	dellars	dollars
Maine New Hampshire	22, 033	67, 662 18, 158	31, 741 19, 765	31, 324 21, 270	49, 518	46, 034	31, 135	30, 522
Vermont	41, 125	34, 979	39, 887	41, 767	11, 356 16, 065	10, 870	19, 311 38, 930	20, 839 40, 624
Massachusetts	KO 499	46, 152	41, 989	44, 814	34, 939	15, 050 34, 313 3, 213	40, 490	43, 658
Rhode Island	5, 352	4, 494 37, 281	6, 540	44, 814 7, 405 37, 167	3, 457	3, 213	6, 279	7, 239
Connecticut	38, 925	37, 281	33, 796	37, 167	26, 134	27, 283	32, 786	36, 000
New York New Jersey	290, 342 200, 187 204, 070 201, 828 77, 198 71, 573 46, 516 45, 711		165, 141	148, 601	243, 421	252, 864		
New Jersey	200, 342 200, 187 204, 070 201, 828 77, 198 71, 573 46, 516 45, 711		60, 936	58, 498	44, 787	44, 714 213, 918		
Pennsylvania Ohio Indiana			130, 877	106, 276	203, 480	213, 918		
Indiana	819, 435 263, 787	179, 811	233, 675	218, 031	1 60, 936 58, 49 2 130, 877 106, 27 4 146, 000 88, 38 1 110, 895 74, 05	268, 537 229, 671	239, 137 214, 394	
Illinois	495, 909	321, 769	353, 515	324, 128	245, 044	154, 701	352, 707	319, 864
Michigan	245, 381	188, 750	184, 445	166, 772	123, 295	90, 483	178, 053	163, 957
Wisconsin	205.478	241, 549	329, 260	309, 699	84, 880	69, 330	178, 053 321, 781	163, 957 297, 098
Minnesota	346, 961	245, 454	317, 324	305, 675 535, 069	134, 166 84, 606 308, 0	308, 010	293, 652	
Iowa	524, 332	354, 453 180, 275	561, 976	535, 069	138, 273	83, 031	565, 485	518, 243
Missouri	329, 091 269, 931	180, 275	291, 937 84, 025	201, 122 81, 100	127, 094 177, 782	70, 964	292, 481	258, 876
North Dakota South Dakota	102 725	183, 584 124, 016	154 068	155 943	75 790	77, 125	82, 760 157, 720 292, 704	74, 136 147, 839
Nebraska	345, 849	250, 997	154, 068 288, 324	155, 243 287, 020	75, 780 134, 304	40, 803 96, 895 111, 301	202 704	280, 499
Kansas	371.052	220, 320	238, 690	239, 351	210, 708	111, 301	237, 615	231, 069
Delaware Maryland	18, 261	13, 927	9, 114	9,074	12, 162	9, 587	8.711	8, 971
Maryland	81, 494	52, 051	44, 369	45, 541	52, 114	33, 269	42, 140	44, 516
Virginia	18, 281 13, 927 9, 114 9, 074 181, 494 52, 051 44, 369 45, 541 198, 318 123, 844 83, 990 77, 407 81, 761 50, 868 50, 186 46, 894 373, 622 272, 128 77, 916 67, 561 183, 605 145, 582 38, 004 30, 649		131, 373	85, 750	82, 435	77, 580		
West Virginia North Carolina			41, 251 29, 297 294, 587 199, 700 142, 732 104, 252 207, 842 160, 722		49, 393	47, 849		
South Carolina					77, 996 37, 005	65, 435 30, 386		
Georgia					75, 834	62, 837		
Florida	109, 062	122, 238	20, 952	19, 887	93, 769	109, 053	22, 073	20, 685
Kentucky Tennessee			87, 064	118, 675	86, 676 92, 060	22, 073 113, 479	92, 065	
Tennessee	229, 224	157, 778	95, 213	81, 208	118, 675 137, 045 186, 706	92, 060	95, 426	80, 921
Alabama	251, 528	174, 008	57, 582	48, 038	186,706	125, 626	57, 934	48, 450
MISSISSIPPI	01 205, 172 149, 391 53, 255 48, 115 238, 184 110, 969 60, 127 44, 109 166, 427 117, 230 32, 499 27, 962 326, 779 143, 088 114, 637 108, 104 780, 789 464, 071 228, 578 214, 290		44 100	214, 584 183, 614	117, 905 85, 580	53, 436 59, 396	45, 847 45, 928	
Louisiana			134, 609	94, 147	32, 467	27, 119		
Oklahoma			240, 298	87, 204 324, 385	32, 467 109, 139	101, 710		
Texas			623, 128	324, 385	225, 843	207, 311		
Montana	123, 024	64, 588	70,740	68, 166	75,087	29, 924	68, 221	62, 817
Idaho	101, 058	83, 771	54, 554	49, 411	64, 306	53, 158	53, 482	46,090
w yoming	31, 519	20, 674	41, 420	38, 408	13, 286 77, 581	13, 737	39, 508	34, 176
New Mexico	126, 936 30, 352	20, 674 123, 615 21, 300	79, 540 34, 455	76, 562 29, 780	20,054	78, 445 13, 803	79, 827 36, 704	76, 70 27, 879
Wyoming Colorado New Mexico Arizona	38, 079	38, 624	22, 365	23, 042	30, 354	31, 315	26, 879	18,00
Utah	42,747	35, 176		33, 861	25, 781	20, 405	37, 467	32, 589
NAVOGO	1 9.137	7, 667	16, 433	11.687	2, 976	2, 30	17, 243	11, 619
Washington	155, 371	128, 689		76, 985	117, 171	96, 461	71, 426	73, 870
Washington Oregon California	95, 503	82, 103	67,708	63, 253	64,811	54, 001	66,759	60, 200
Camornia	484, 973	455, 603	185, 471	194, 079	412, 589	397, 290	182, 739	189, 24
United States	9,942,938	4 6,964, 022	5, 833, 858	5, 514, 038	3 5,928, 638	4 4,031, 926	5, 770, 554	5, 370, 01

See footnotes at end of table.

Table 455.—Farm value, gross income, and cash income from farm production, average, 1924-1928 and 1930—Continued.

	Gross in	come 2			Cash in	come 5		
State	Crops and comb	livestock ined	Cre	ops	Livesto livestock		Crops and	l livestock bined
	Average, 1924–1928	1930	Average, 1924–1928	1930	A verage, 1924–1928	1930	Average, 1924–1928	1930
Maine New Hampshire Vermont Massachusetts Rhode Island Connecticut New York New Jersey Pennsylvana Ohio Indiana Illinois Misconsin Minesota Ilowa Missouri North Dakota South Dakota South Dakota South Dakota South Dakota South Carolina Georgia Florida Kentucky Tennessee Alabama Missispi Arkansas Loulas Loulas Loulas Olicas Colicas Co	9, 920 408, 561 105, 561 105, 567 334, 356 414, 536 340, 567 597, 752 301, 348 406, 661 442, 176 703, 758 419, 575 280, 542 203, 500 427, 007 448, 323 20, 873 90, 644 372, 583 179, 737 283, 675 115, 842 232, 472 244, 640 268, 202 243, 010 167, 076 349, 436 848, 910 167, 076 349, 436 848, 794 143, 308 117, 409 143, 308 157, 409 157, 409 157, 409 157, 409 157, 409 157, 409 157, 409 157, 233 57, 233 57, 233	1,000 dollars 76,555 31,7694 77,971 10,462 328,465 327,525 328,465 328	1,000 dollars 41,638 8,035 20,345 22,884 140,725 56,491 188,134 118,700 97,470 115,502 10,586 44,592 103,244 25,403 121,609 171,271,666 124,059 115,530 117,271,6696 118,707 118,527 118,707 118,527 1	301, 556 27, 080 50, 559 12, 906 75, 907 12, 656 30, 091 18, 653	7, 077 42, 197 31, 704 20, 662 10, 481 27, 288 67, 936 51, 011 22, 652 18, 347 71, 802 148, 898 59, 484 47, 137 24, 188 33, 751 24, 188 33, 751 24, 188 33, 751 24, 188 35, 484 47, 137 24, 188 35, 16, 180 56, 56, 56, 56, 56, 56, 56, 56, 56, 56,	29, 279 10, 761 64, 487 53, 123	24, 803 46, 549 84, 672 8, 462 50, 438 354, 762 95, 907 262, 9612 383, 903 284, 004 526, 480 227, 894 353, 390 387, 614 353, 390 387, 614 404, 825 17, 674 76, 784 150, 761 151, 1676 132, 100 103, 520 1158, 331 170, 648 187, 340 187, 340 188, 199 1118, 497 111, 497 111, 988 153, 461 157, 525 17	330, 023 543, 748 543, 748 543, 748 131, 548 168, 696 344, 907 109, 320 47, 995 190, 586 94, 116 157, 650 111, 857 111, 807 111, 807 111, 807 146, 722 442, 252 842, 102 91, 196 44, 224 143, 109 94, 136, 846 45, 520 47, 932 12, 917 133, 927 115, 927 115, 927 115, 927 115, 927 115, 927 115, 927 115, 927 115, 927 115, 927 1102, 040
United States							574, 456 3 9, 920, 656	567, 693 47, 875, 876

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<sup>&</sup>lt;sup>1</sup> Commodities included are those shown in Table 452. Estimated quantities produced by States, times weighted annual prices, by States.

<sup>2</sup> Estimated quantities sold and consumed in farm households, by States, times weighted annual prices

by States.

3 Includes \$3,507,000 for sugar beets in "Other States."

4 Includes \$6,047,000 for sugar beets in "Other States."

5 Estimated quantities sold, by States, times weighted annual prices, by States; gross income equals cash income plus value of quantities consumed in farm households, times weighted annual prices.

Table 456.—Farm value, gross income, and cash income from farm production, United States, average 1924–1928 and 1930

Lespodesa seed		Farm	value	Gross i	ncome	Cash i	ncome
Dry edible beans	Product	Average, 1924-1928	1930	A verage, 1924–1928	1930	Average, 1924–1928	1930
Dry edible beans	Crops:	1,000 dolls.	1,000 dolls.	1,000 dolls.	1,000 dolls.	1.000 dolls.	1.000 dolls.
Dry edible beans	Corn	2, 252, 421	1, 258, 313	397,030	182, 178	370, 828	160, 433
Dry edible beans	Wheat	1,006,210	566, 231	847, 239	401, 441	833, 837	393, 224
Dry edible beans	Oats	594, 215	463,708	147, 216	79,901	147, 216	79, 901
Dry edible beans	Barley	152, 449	188, 074	61,801	35,650	61,301	35,650
Dry edible beans	Nye	10 501	7 470	00,002	13, 597	33, 124	18, 347
Dry edible beans	Duck wheat	40 418	36 588	AR 194	2, 500	0,000	4, 107
Dry edible beans	Rice	44,011	33, 016	41, 685	31 438	41 817	21 410
Dry edible beans	Grain sorghums	90, 438	48, 720	17, 971	8, 849	17, 971	8, 849
Dry edible beans	Emmer and spelt	2,486		202	117	202	117
Dry edible beans	Popcorn	1,816	2, 304	1,816	2,304	1,816	2,304
Dry edible beans	Cotton lint	1, 373, 964	656, 381	1, 373, 964	656, 381	1 273 USA	656, 381
Dry edible beans	Cottonseed	206, 510	134, 182	152, 923	91,576	152,923	91, 576
Dry edible beans	Topacco	1 000, 201	1 054 388	200, 201	210,090	900, 201	210, 890
Dry edible beans	Sweet coronim forece	32 898	32,837	3, 037	2 658	3 037	2 658
Dry edible beans	Hemp	144	114 1	144	114	144	114
Dry edible beans	Cloverseed (red and alsike)	17, 239	17, 259	14, 261	14,745	14, 261	14, 745
Dry edible beans	Sweetclover seed	5, 496	2,323	3,971	1,658	8,971	1,053
Dry edible beans	Lespedeza seed	737	267	483			
Dry edible beans	Alfalfa seed	9,438	9,745	8, 444 5 700	9, 133	8,444	9, 133
Potatoes, white	Timothy seed	6,000	53,020	48,048	5, 485 50 025	0, 102 47 848	<b>40 60</b> 0
Potatoes, white	Sovbeans	25 381	34, 024	6.997	11, 622	6, 997	11, 622
Potatoes, white	Cowpeas	32, 733	21,086	4,271	0.102	2,991	2, 320
Potatoes, white	Peanuts	61, 238		37, 393	21, 997	36, 076	21, 350
Potatoes, white	Velvetbeans	12, 983	14, 532				
Sweetpotatoes	Broomcorn	5,086	8,263	5,080	3, 263	5, 086	3, 263
Plums and apricots	Polatoes, White	413, 905	348, 302	02 724	287, 002	207, 441	40 970
Plums and apricots	True orang	212 273		313, 873	336, 117		313.848
Plums and apricots	Hors	6,066	3, 462	6,066	3, 462	6,066	3, 462
Plums and apricots	Apples	202, 086	167, 845	194, 283	162, 257	156, 181	130, 234
Plums and apricots	Peaches	62, 966	43, 653	60, 462	40,716	46, 549	32, 203
Plums and apricots	Pears	25, 423	19, 932	24, 017	19, 221	20,244	16,447
Other fruits and nuts.         195, 342 (7, 108)         201, 388 (7, 308)         105, 790 (7, 388)         104, 381 (7, 388)         104, 381 (7, 388)         104, 381 (7, 388)         104, 381 (7, 388)         104, 381 (7, 388)         104, 381 (7, 388)         104, 383 (7, 388)         20, 383 (7, 388)         20, 383 (7, 388)         20, 383 (7, 388)         20, 383 (7, 388)         20, 383 (7, 388)         20, 383 (7, 388)         20, 383 (7, 388)         20, 383 (7, 388)         20, 383 (7, 388)         20, 432 (7, 388)         20, 383 (7, 388)         20, 432 (7, 388)         20, 383 (7, 388)         20, 432 (7, 388)         20, 433 (7, 388)         20, 433 (7, 388)         20, 433 (7, 388)         20, 433 (7, 388)         20, 433 (7, 388)         20, 433 (7, 388)         20, 432 (7, 388)         20, 432 (7, 388)         20, 432 (7, 388)         20, 432 (7, 488)         2	Unerries	10 097		10 666	10,940	4,450	3 264
Other fruits and nuts.         195, 342 (7, 108)         201, 388 (7, 308)         105, 790 (7, 388)         104, 381 (7, 388)         104, 381 (7, 388)         104, 381 (7, 388)         104, 381 (7, 388)         104, 381 (7, 388)         104, 381 (7, 388)         104, 383 (7, 388)         20, 383 (7, 388)         20, 383 (7, 388)         20, 383 (7, 388)         20, 383 (7, 388)         20, 383 (7, 388)         20, 383 (7, 388)         20, 383 (7, 388)         20, 383 (7, 388)         20, 383 (7, 388)         20, 432 (7, 388)         20, 383 (7, 388)         20, 432 (7, 388)         20, 383 (7, 388)         20, 432 (7, 388)         20, 433 (7, 388)         20, 433 (7, 388)         20, 433 (7, 388)         20, 433 (7, 388)         20, 433 (7, 388)         20, 433 (7, 388)         20, 432 (7, 388)         20, 432 (7, 388)         20, 432 (7, 388)         20, 432 (7, 488)         2	Granes	63 219	43, 378	62, 280	42, 803	58, 497	39, 968
Total	Other fruits and nuts	195, 842	201, 398	195, 795	201, 346	194, 531	200, 190
Total	Strawberries	55, 397	47, 108	55.397	47, 108	54, 816	4R 475
Total	Small fruits	24, 393	20,833	24, 393	20, 883	24,032	20, 434
Total	Cranberries	6,313	5,789	9,055	5, 769 K 020	7 714	4 005
Total	Crear heats for more	8, 900	8K 704	54, 374	85 704	i KA 274	1 A5 704
Total	Sugar beets, for sugar	26, 969	21, 507	18, 210	16, 358	12,082	1 11 741
Total	Sorghum sirup	25, 382	19, 921	18, 256	13,376	7,812	5, 347
Total	Maple sugar and sirup	8, 681	9, 607	8, 681	9, 607	7,578	8, 721
Total	Forest products	314, 472	299, 727	314,472	299, 727	182, 207	178, 704
Total	Farm gardens	290, 136	240, 402	20, 130	20, 402	20 432	20, 432
Total 9, 942, 938 6, 964, 022 5, 928, 638 4, 031, 926 5, 261, 368 3, 452, 731  Livestock and livestock products:	Greenhouse products	76 830	76, 839	76, 839	76, 839	76, 839	76, 839
Livestock and livestock products:  Oattle and calves.  Oattle and calves.  1, 508, 382 1, 508, 403 175, 224 144, 321 153, 162 142, 173 160, 027 148, 020 1, 252, 107 1, 252, 1				5, 928, 638			3, 452, 735
Cattle and calves         922, 688         990, 023         1,003, 674         937, 023         974, 331         905, 397           Hogs         1,588, 342         1,354, 630         1, 546, 916         1, 546, 916         1, 546, 916         1, 270, 907         1, 252, 107         1, 120, 90							
Milk   1,919,604   1,883,756   1,829,175   265,447   244,01	Livestock and livestock products:	000 000	000 000	1 002 874	037 092	074 221	OOK 200
Chickens	Uattle and carves	928,088	1 254 030	1,000,074	1 376 097	1 252 107	1. 126, 900
Chickens	Sheep and lambs	175 224	144 342	153, 162	142, 173	150, 026	1 130 111
Chickens	Horses	41,931	25 075		9, 242	1 14 XIIX	9, 242
Wool.     34,032     65, 287     74,457     5, 287     7, 457     7, 457     5, 287     7, 457     5, 287     7, 457     7, 457     7, 457     8, 013     3, 73     2, 287 <td>Mules</td> <td>20,062</td> <td>15, 433</td> <td>11, 422</td> <td>7, 150</td> <td>11, 422</td> <td>7, 150</td>	Mules	20,062	15, 433	11, 422	7, 150	11, 422	7, 150
Wool.     34,032     65, 287     74,457     5, 287     7, 457     7, 457     5, 287     7, 457     5, 287     7, 457     7, 457     7, 457     8, 013     3, 73     2, 287 <td>Chickens.</td> <td>428, 808</td> <td>387, 600</td> <td>430,060</td> <td>394, 880</td> <td>205, 497</td> <td>244,012</td>	Chickens.	428, 808	387, 600	430,060	394, 880	205, 497	244,012
Wool.     34,032     65, 287     74,457     5, 287     7, 457     7, 457     5, 287     7, 457     5, 287     7, 457     7, 457     7, 457     8, 013     3, 73     2, 287 <td>Eggs (chicken)</td> <td>698, 037</td> <td>652, 962</td> <td>1 820 175</td> <td>1 705 800</td> <td>1 380 188</td> <td>1 422 212</td>	Eggs (chicken)	698, 037	652, 962	1 820 175	1 705 800	1 380 188	1 422 212
	Mool	1,819,604	1,000,100	94, 032		94, 032	85 842
	Mohair	7, 457	5, 287	7,457	5, 287	7.457	5, 287
	Honey	11,367	9,670	11, 367	9,670	8,013	7,349
	Beeswax	307	218	307	218	307	218
Grand total 11 800 102 Q 401 Q3Q Q 920 858 7 875 87		5, 833, 858	5, 514, 038	5, 770, 554	5, 370, 013	4, 659, 288	4, 423, 141
GIBHU 60681	Grand total			11, 699, 192	9, 401, 939	9, 920, 656	7, 875, 876

Bureau of Agricultural Economics. Estimated quantities produced, sold, and consumed in farm households times weighted annual prices. Cash income plus value of commodities consumed in farm households equals gross incomes. For feed and seed crops, horses, and mules, value includes sales by farmers in some States eventually bought by farmers in other States. These interfarms sales tend to overestimate the total income from farm production for the country as a whole.

Table 457.—Gross income from farm production by groups of commodities, expenditures, income available for operators' capital, labor, and management and current value of capital employed in agriculture, United States, 1924-1930

Item	1924	1925	1926	1927	1928	1929	1930
Crops: Grains. Fruits and nuts Vegetables. Sugar crops. Cotton and cottonsed. Tobacco Other crops	953 104 1,710	Million dollars 1, 496 683 1, 193 95 1, 740 251 689	Million dollars 1, 432 694 1, 093 1, 251 237 659	Million dollars 1, 592 690 1, 062 104 1, 464 257 649	Afillion dollars 1, 513 705 967 92 1, 470 278 650	Million dollars 1, 281 722 1, 180 97 1, 389 283 657	N fillion dollars 760 586 963 105 748 217 592
Total crops	6, 170	6, 147	5, 468	5, 817	5, 675	5, 609	3, 971
Livestock and livestock products: Cattle, hogs, and sheep Poultry and eggs. Dairy products Wool. Other	000	2, 822 1, 114 1, 759 97 28	2, 922 1, 167 1, 805 88 30	2, 664 1, 108 1, 911 86 30	2, 727 1, 202 1, 994 111 32	2, 817 1, 254 2, 109 94 28	2, 455 1, 037 1, 796 66 22
Total livestock	5, 167	5, 820	6, 012	5, 799	6, 066	6, 302	5, 376
Total crops and livestock	11, 337	11, 968	11, 480	11, 616	11, 741	11,911	9, 347
Operators' expenditures: Operating costs 1 Wages to hired labor 2 Taxes 2 Interest 4 Rent 4	2, 541 1, 206 458 712 927	2, 888 1, 219 459 705 958	2, 727 1, 241 465 899 809	2, 740 1, 234 475 690 911	2, 968 1, 228 482 684 916	2, 977 1, 231 490 681 953	2, 724 1, 011 490 671 701
Total deductions	5,844	6, 229	5, 941	6, 050	6, 278	6, 332	5, 597
Balance available for capital, labor, and management: Total. Per farm, in dollars * Capital: Total 7. Total operators' capital used in production * Income available for operators' capital and management *	5, 493 862 57, 718 27, 421 1, 088	5, 739 903 57, 861 27, 633 1, 292	5, 539 874 56, 754 26, 886 1, 005	5, 566 880 57, 256 27, 410 1, 065	5, 463 866 58, 141 28, 183 972	5, 579 887 58, 130 28, 177 1, 060	3, 750 598 52, 747 24, 132 —346
Income available for operators' capital and management as per cent of operators' capital	Per cent 4.0		Per cent 3. 7	,			

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<sup>2</sup> Estimates of cash wages and board, and 10 per cent allowance for perquisites and hired domestic labor contributing to production.

taxes on farm dwellings.

4 Paid on all bank loans and on 90 per cent of total farm mortgage debt held by nonfarmers, 10 per cent of the total mortgage debt being assigned to farm dwellings.

5 Paid on 72 per cent of all rented farms to nonoperators.

6 Estimated number of farms interpolated between 6,372,000 on Jan. 1, 1925, and 6,289,000 on Apr. 1, 1990.

7 As of Dec. 81, includes land, buildings, machinery, livestock, and 1 per cent cash working capital.

8 All capital used in production excluding value of farm indebtedness to nonfarmers and value of farms rented from nonfarmers. This total includes value of autos used for pleasure which probably offsets value of dwellings used for production.

rented from nonfarmers. This total includes value of autos used for production.

of dwellings used for production.

Income available for all capital, labor, and management, less wage allowance for labor of operators and families. Operators are here allowed an annual hired-hand wage without board, and family labor is taken as 22 per cent additional to the operators' labor. The value of the operator's labor is here understated in so far as hired hands receive prequisites in addition to cash and board, and it may be overstated in so far as the operator's time is not entirely spent on farm work.

<sup>&</sup>lt;sup>1</sup> All of the operating costs indicated in Table 4, Crops and Markets, September, 1931, p. 308, except 7.5 per cent of total fertilizer costs, 9.5 per cent of feed, 10 per cent of binder twine, 15 per cent of ginning costs, and 20 per cent of repairs on buildings and insurance. These deductions are estimated as paid by non-

<sup>&</sup>lt;sup>3</sup>70 per cent of estimated total taxes on all farm real estate paid by operators, less 10 per cent to allow for taxes on farm dwellings.

of amimitural camial, gross income from farm production, and selected expenditures. United. States. 1909–1931 ζ É

Calendar year capital come   Arithma   TABLE 458.—Current value of agricultural capital, gross moome from furnitation, and secured Expensivales, Onese Dunes, 1909-1901.	capitat, g	ross theon	ne frome for	true proud	Catore, area	namanas 1	e permenui	es, Orentan	Diules, 1	1091-601	
According to the color of the		Current					Sclected ex	penditures			
Addition         Addition	•	value of agricultural capital 1	Gross in- come a	Wages (in- cluding board) 8	Feed 4	Fertilizer 5	Farm implements (excluding autos and trucks)	Other farm machinery and their costs of op- eration i	Ginning 8		Interest on nortgages 10
41, 384         6, 28         6, 43         6, 44         <		Million	١.	Million	Million	Million	Afillion	Million	Mullion	Million	Million
45,866         6,648         6,748         873         137         210         836         388           46,081         6,778		41.384		652	and 300	115		aonars	88	983	199
46,001         6,773         973         113         247         65         275           47,704         6,774         7,774		42,985	6,648	674	302	137			8	388	210
45, 703         6,774         <	011	44,086	6, 372	878	873	152			25	275	122
47,702         45,702         45,703<	019	- 48,081	6,734	8	838	163			4	278	222
60, 588         7, 80         7, 80         7, 10         <	918	- 47,778		727	453	172			\$ 5	200	2
1,000   1,00	914	27,800		250	7.5	282			88	200	202
61,676         13,883         941         871         217         513         642         810         8	016	35		788	838	150			2 2	202	800
67,066         15,101         1,102         297         666         663         316           71,701         13,606         15,806         1,007         280         663         663         77         380           61,444         9,044         977         474         20         47         432         47         432           61,444         9,044         971         688         210         280         766         678	919	61.576		176	35	212			2.5	310	3,5
75,000   16,005   1,505   1,507   250   643   777   250   643   643   777   250   643   643   643   643   643   643   643   644	716	67,055		1, 162	1.033	8			7	345	35
Columbia   Columbia	010	79,090		1,356	1,097	328			L	380	469
Columbia   Columbia	UGU	102,17		1, 557	728	320			16	472	545
0,464   9,944   971   588   210   231		- 63,091		266	484	217			47	633	254
85,907         11,040         1,088         670         229         383         61         718           67,718         11,887         1,074         750         281         393         755         92         727           67,728         11,687         1,167         784         283         266         429         916         727           68,144         11,148         779         274         460         741         121         738           78,141         11,741         878         278         460         774         764         774           88,140         11,741         11,741         878         278         698         918         88         777           88,180         11,911         1,165         919         271         678         88         777           88,180         18,917         1,166         806         208         480         815         777           9,927         80,620         286         280         286         89         777	660	- 61,454		11/6	200	210			22	878	899
67,718         11,837         1,074         750         231         850         756         ES         727           66,724         11,630         1,137         836         400         741         121         728           66,724         11,480         1,118         778         284         460         741         121         738           66,724         11,410         1,148         778         284         460         741         121         738           68,130         11,741         1,148         878         878         874         876         766           68,130         11,911         1,146         809         271         678         88         89         777           68,130         11,911         1,166         806         806         806         806         806         806         806         777	860	68,997		1,088	670	220			19	718	564
65,744         11,908         1,137         828         256         429         916         100         729           66,744         11,408         1,118         779         224         444         874         773         778           68,14         11,714         11,147         897         273         649         918         777           68,14         11,21         1,147         897         273         678         918         58           68,14         11,21         1,116         910         271         678         885         89           68,14         11,911         1,116         910         271         678         88         89           68,14         11,911         1,116         910         271         678         88         89           68,27         1,001         1,106         80         80         80         777	924	- 67, 718		1,074	750	231		755	23	727	299
66,744         11,450         1,161         734         235         460         741         121         778           68,146         11,016         1,148         779         273         460         874         77         764           68,140         11,741         1,147         878         273         608         918         83         777           88,180         11,741         1,116         919         271         678         88         777           88,180         1,911         1,106         806         208         480         80         777           9,277         6,920         806         806         208         815         777	220	- 67,861		1, 137	828	255		916	100	822	888
67, 200         11,400         1,144         779         224         404         874         775         764           88, 130         11,741         1,147         899         271         678         885         89         777           88, 130         11, 911         1,106         919         271         678         885         89         777           88, 130         14, 606         806         806         806         816         778         777	956	- 66, 764		1,151	734	253		741	121	738	208
88,141     11,741     1,147     897     273     678     918     88     776       88,180     11,911     1,195     910     271     678     885     89     777       62,747     9,347     1,006     806     208     480     815     78       6,920     500     500     500     500     915     77		67,256		1,148	82	25.		874	22	764	268
68,130     11,911     1,195     919     271     678     885     59     777       62,747     9,347     1,036     830     298     450     815     78     777       6,220     80     80     20     80     815     78     777	828	08,141		1,147	897	273		818	88	202	88
62, 127 8, 347 1, 036 806 228 480 815 78 777 6, 920 805 550 550 550 550 805 550 550 805 550 805 550 805 550 805 805	929	- 68,130		1, 195	916	271		288 88	8	111	554
6, 920	930	- 02,747		1,88	200	288		812	28	1111	2 <u>4</u> 0
	931 11		6, 920	808	200						

Tentative estimates of the bureau. Bureau of Agricultural Reenomics.

1 As of end of year. Includes land, buildings, machinary livestook, and working capital (estimated at 1 per cent of other items). Interpolation between census estimates: Land and buildings based on index of land values yor acre and straight line interpolation of total acreage in farms, livestook, annual estimates of United States Department of Agriculture; machinary, future positions of estimated values of land and buildings, 1909-190; line interpolations, 1920-1924 and 1925-1930.

\*\*Interpolations between census estimates, based on United States Department of Agriculture index of farm wages.

\*\*Interpolation between census years based on an index of prices paid by farmers for feed and an index of facility is product of the two indexes was adjusted to equal the enjang values of feed punished.

Inferpolated between consus estimates, based on index of value derived from total fartilizer consumption and United States Department of Agriculture index of fartilizer prices

paid by farmers.

1906-1819: 1800, 1914, and 1919 census values of farm implements produced adjusted to represent total farm equipment's sold in the United States at farm values. Interpolations for other values of 1909-1819: 1800, 1914, and 1919 census values controlled by the National States raised to represent farm values.

1 Indicate estimated costs at nonmobiles, trunks, and tractors; 80 per cent of annual farm purchases of autos and trucks, and harness and saddiary.

4 Annual cotton production, multiplied by ginning costs per bate.

1 104-1923, estimates been contained survey of tax rates per acce.

1914-1923, estimates been contained survey of tax rates per acce.

1914-1923, passed on annual survey of tax rates per acce.

1914-1923, estimates been contained been contained survey of tax rates per acce.

1924-1923, estimate between total farm mortgages for 1910, 1920, 1925, 1929, using smoothed estimates to 1911-1919 darived from value of current agricultural capital, and amount carrent agricultural capital, and amount carrent agricultural capital, and smooth curve, 1920-1930.

Table 469.—Farm returns, 1922-1930

[Average of reports of owner-operators for their own farms for calendar year]

Item				Qui	United States	88	ŀ			North Atlantic		East North Central		West North Central	orth	South Atlantic	Hic Fig	South Central	-3	Western	<b>e</b>
	1922	1823	1924	1926	1028	1927	1928	1929	1930	1929	1930	1929	1930	1920	1930	1920	1930	1020	1930	 1920	1930
	6, 004 262	16, 183	15, 103	15,330	13, 476	13, 859	11, 851	11,805	6, 28, 28,	1,255	137	2, 331 146	1,355	2, 594 350	1, 477	1,499	198	2,719 1,	158	1,407	888
	13, 586	\$14, 530 \$14,	14, 323	\$14, 157	323 \$14, 167 \$13, 379 \$12,	12, 543 \$12,	200	\$12,090 \$12,	12,009	009 \$8, 566 \$8, 286		\$11,693	693 \$11, 789 \$17,	920	\$17, 152\$7,	7,896 \$8,	3, 152 88,	, 643 \$8,	346	\$16, 219 \$16,	6,050
	2,844	2, 960	2, 937	2,986	2, 929	2, 898	3, 118	8, 162	3, 156	3,459	8, 513	2,997	2,988	4, 538	4, 387	1,668	1,788 1	1, 918	1, 780	4, 559	4, 484
	818 960	28.65	1, 012	807	828	978	258	1,029	782	831	848	906	454	1, 806	1, 520	1, 119	323	1, 143	2682	1, 116	1,520
	454	<u>8</u>	670	38	88	88	82	37	88	1,623	1,607	88	888	358	282	88	362	255	1833	786	213 88
	1, 972	2, 240	2, 434	2, 651	2,448	2, 505	2,608	2,669	2,211	2, 990	2, 958	2, 426	2,089	3, 257	2,687	1,894	1, 478	1, 900 1,	884	3,996	3,081
	1883	250	28.83	386	386	238	228	380	878	428	4 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	202	285	25.88	88	416	88	859	333	204	699 175
	72	53	84	84	3E3	8 <u>4</u> 4	\$25	<u> </u>	588	1228	\$13.5 4	288	<u>188</u> 4	325	823	<u> </u>	222	97.8	388	300	385
	<u> </u>	8119	282	595	288	222	<u> </u>	1555 1565 1565 1565 1565 1565 1565 1565	825	<u> </u>	25.5	1812	<b>8</b> 288	8258	12 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	35.88 35.88	85.738	<u> </u>	8 <u>1</u> 82	287 287 287	\$8.09£
2 1	1,257	1, 350	1, 410	1,477	1,473	1, 457	1, 518	1, 572	1,452	1, 927	1, 976	1, 374	1, 245	1,834	1, 691	1, 275	1, 154	1, 081		2,383	2,083
	715	986	1,024	1,074	97.6	1,048	1,090	1,097	759	1,083	28	1,062	25	1, 423	966	619	324	838	388	1, 633	88
- 1	202	138	181	82	158	242	244	201	-221	101	-100	138	-240	281	-401	145	-110	159	-168	361	130
- 11	216	1,020	1, 205	1, 297	1, 133	1, 290	1, 334	1, 298	238	1, 254	882	1,178	604	1,684	282	764	214	1882	217	1, 994	88
	ε	230	230	225	215	201	202	199	199	105	106	173	170	339	930	92	88	125	137	323	30,
		140	133	131	128	141	126	128	8	130	117	127	8	152	86	**	8	88	60	164	111
	204	285	- - - - -	274	282	273	289	282	242	287	257	269	246	282	240	286	200	242	220	227	219

914	- 938
1,024	+127
465	-647
505	+20
472	-626
492	-11
844	+5 -1, 216
918	+
767	-697
845	-20
865	-158
914	4
718	-757
412	+37
768	+
768	+61
77.0	+3
703	+173
789	+145
870	99-
716	-52
Value of family labor, including owner Change in value of real	estate during the year (minus sign () shows decrease)

Burean of Agricultural Economics. Compiled from reports of individual farms operated by their owners. Division averages for 1922 in Agriculture Yearbook; 1925, pp. 1342–1343; for 1925 in Yearbook of Agriculture, 1927, pp. 1132–1133; for 1926 in Yearbook of Agriculture, 1929, pp. 1038–1039; for 1928 in Yearbook of Agriculture, 1930, pp. 972–973; for 1928–29 in Yearbook of Agriculture, 1930, pp. 972–973; for 1928–29 in Yearbook of Agriculture, 1930, pp. 972–973; for 1928–29 in Yearbook of Agriculture, 1930, pp. 972–973; for 1928–29 in Yearbook of Agriculture, 1930, pp. 972–973; for 1928–29 in Yearbook of Agriculture, 1930, pp. 972–973; for 1928–29 in Yearbook of Agriculture, 1930, pp. 972–973; for 1928–29 in Yearbook of Agriculture, 1930, pp. 972–973; for 1928–29 in Yearbook of Agriculture, 1930, pp. 972–973; for 1928–29 in Yearbook of Agriculture, 1930, pp. 972–973; for 1928–29 in Yearbook of Agriculture, 1930, pp. 972–973; for 1928–29 in Yearbook of Agriculture, 1930, pp. 972–973; for 1928–29 in Yearbook of Agriculture, 1931, pp. 972–973; for 1932–973; for 1932–973; for 1932–973; for 1932–974, pp. 972–973; for 1932–974, pp. 972–974, <sup>2</sup> Averages of farms for which the item was reported.

Tablo 460.—Farm returns: Proportion of farmers obtaining net results within specified ranges, 1923–1930

<sup>1</sup> Not reported for 1922.

South Western	1929 1930 1929 1930	255 246 683 608 0, 661 10, 126 20, 778 20, 534 987 217 1, 994 868	Per Per Conf. Conf
South Atlantic	1930	409 643 2 184 198 553 9, 940 10	Per
	1930 1929	,477 360 539 9,	Per Per Cent Cent Cent Cent Cent Cent Cent Cent
West North Central	1920	2, 594 1, 350 22, 488 21, 1, 684	Part 1
East North Central	1830	331 1, 355 146 148 690 14, 777 178 604	9 9 .1.1.8.9.1.4.8.8.4 Si
	1920	703 2, 33 137 14 799 14, 66 882 1, 17	7 2-144 2 5 5 4 5 5 6 5 6 6 6 7 5 1 4 4 5 5 5 4 5 5 6 6 6 6 6 6 6 6 6 6 6 6
North Atlantio	1629	1, 255 139 12, 025 1, 254	F#E4252248414 8
	1930	6, 228 284 5, 165 5, 38	Per Per Per Per Per Per Per Per Per Per
	8 1929	284 270 284 270 116, 417 15, 242 1	12 2 2 4 4 5 5 5 6 6 5 6 6 6 6 6 6 6 6 6 6 6 6
, m	1927 1928	13, 859 11, 8 275 2 15, 436 15, 4 1, 290 1, 3	F 7 7 4 8 8 8 8 4 8 8 8 8 8 8 8
United States	1926	13, 475 13, 815 16, 308 15, 1, 133 1,	11
Unitk	1925	15, 330 17, 122 1, 207	00.00 4 6 6 8 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
	1024	183 15, 103 298 303 490 17, 200 020 1, 205	nd 1 1 1 2 2 1 1 1 1 2 2 1 1 1 2 2 1 1 1 2 2 1 1 1 2 2 1 1 1 2 2 1 1 1 2 2 1 1 1 2 2 1 1 1 2 2 1 1 1 2 2 1 1 1 2 2 1 1 1 2 2 1 1 1 1 2 2 1 1 1 1 1 1 2 2 1
	1923	17,	# 8-44 mm 188 mm   S
	1922	16, 430	Per cent 1.77.88 1.4.89 1.4.77.78 1.4.89 2.7.88 2.7.88 2.7.88 2.7.88 2.7.88 2.7.88 2.88 2
	цеш	Number of reports Size of farm Size of farm property Jan. 1 per darm	Proportion obtaining: \$5,000 or more. \$5,000 to \$4,000. \$5,000 to \$2,000. \$5,000 to \$2,000. \$5,000 to \$1,000. \$5,000 to \$100. \$5,00 to \$100.

Burean of Agricultural Economics. The reports are those tabulated in Table 459 (preceding). For distribution by geographical divisions, see Table 476, Yearbook, 1927; Table 509, Yearbook, 1928; Table 611, Yearbook, 1930, and Table 459, Yearbook, 1831.

TABLE 461.—Wheat: Cost of production by yield groups and geographical divisions, 1930

1			Атотопо				Gross cost per acre	por acre				;	Net cost	ost
Y feld group (bushels per ecre) and geographical division	Reports	acreage in wheat per farm	yield per acre	Prepare and plant	Harvest and thresh	Market	Fertilizer and manure	Seed	Land	Miscella- neous 1	Total	( straw)	Per acre	Per bushel
Winter-wheat belt: \$ 12 and under 13 to 18. 19 to 24. 25 and over	Number 213 1189 109 57	Acres 105 149 84 105	Bushels 9 15 20 29	Dallars 2.75 2.96 2.98 3.17	Dollars 2. 63 8. 17 3. 78 4. 51	Dollars 0.58 .77 .91 1.07	Dollars 0.91 .87 .85	Dollars 1.15 1.11 1.16 1.23	Dollars 3. 27 4. 33 5. 05 6. 86	Dollars 1.88 2.07 1.87 2.21	Dollars 13, 15 16, 28 16, 60 19, 79	Dollars 0.52 .37 .67	Dollars 12, 63 14, 91 15, 93 19, 36	Dollare 1.40 .99 .80 .67
Total or average	618	112	15	2, 91	3.23	.75	.87	1.15	4.31	2,00	15. 22	02.	14.73	88.
Spring-wheat bolt: a 12 and under 13 to 18.	148 85 40	159 126 72	9 25 23	3.03 3.21	2.45 3.88	.73 .73	38.	1.23 1.43 1.68	2,47 3,28 4,84	2 2 14 2 48	12.04 13.76 17.83	8.8.8	11.84 13.68 17.51	1.33 28.5
Total or average	273	136	13	2,98	2.81	89.	. 42	1.36	3. 10	2.13	13, 48	.21	13, 27	1.02
Googrpahical division: North Atlantic Bast North Central. West North Central. South Atlantic South Central	204 502 821 833 131 131	16 24 104 104 107	88 81118 81118	7.5.5.4.4.2.3.4.4.2.3.4.4.2.3.4.1.3.	5,48 8,39 8,17 4,44 8,30 8,85	1,42 .96 .78 1,38 1,09	3. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3	2 38 1 28 1 28 1 1 82 1 1 1 7	6 2 4 2 4 2 6 1 6 2 4 2 4 2 4 2 4 2 4 2 4 2 4 2 4 2 4 2	2 48 2 52 2 52 2 67 1 98 3 46	81.01 21.67 15.17 24.07 15.44	4.97 1.77 2.62 2.63 .68	28.04 14.73 14.73 23.63	11. 11. 11. 12. 28. 28. 28. 28. 28. 28. 28. 28. 28. 2
United States	2, 334	11	18	3.76	3.82	1.00	2.27	1. 59	6.14	2.58	21. 13	1.48	19. 65	1.09

Bursau of Agricultural Economics. From returns to mail inquiry sent to crop reporters. For figures by yield groups for 7 years, 1923-1929, see Agriculture Yearbooks, 1924, p. 1135; 1925, p. 1136; 1928, p. 1041; 1930, p. 894; and 1931, p. 1013. For figures by geographical divisions for 7 years, 1923-1929 see June issues of Monthly Supplement, Crops and Markets, 1924, p. 176; 1925, p. 180; 1928, p. 170; Crops and Markets, June issues, 1927, p. 202; 1929, p. 202; 1930, p. 203.

<sup>1</sup> Includes miscellaneous labor, irrigation (including water), seed treatment, sacks and twine, crop insurance, use of implements, use of storage buildings, and overhead.

\* Winter-wheat belt as used here includes Kansas, Nebraska, Missouri, and Oklahoma.

\* Spring-wheat belt as used here includes western Minnesota, North Dakota, eastern South Dakota, and eastern Montans.

Table 462.—Corn: Cost of production by yield groups and geographical divisions, 1930

		Average					Gross cos	Gross cost per acre					Credit	Net cost	cost
Yield group (bushels per acre) and geographic division	Reports	ncreage in corn per farm	Average yield per acre	Prepare and plant	Culti-	Harvest	Market	Fertili- zer and manure	Seed	Land	Miscel- laneous <sup>1</sup>	Total	per acre (stover and fodder)	Per acre	Per bushel
All reports: 7 and under 8 to 17 18 to 27 28 to 37 28 to 37 28 to 47 48 to 67 68 and over	Number 518 974 879 879 562 883 176 94	Acres 31 38 38 48 47 47 88 88 88 88 88	Bushels 82 22 82 41 61 66	DCL 8.8.8.8.8.8.8.8.8.8.8.8.8.8.8.8.8.8.8.	Dollars 2.96 2.84 2.84 3.83 3.47	Dollars 1. 57 2. 16 2. 26 3. 25 3. 55 4. 58 5. 10	Dollars 0.40 1.94 1.67 1.91 8.50	Dollars 2, 62 2, 70 2, 70 3, 15 4, 30 7, 52 7, 52	Dollars 0.45 .45 .45 .55 .60	Dollars 4. 16 4. 34 5. 19 5. 98 6. 75 7. 41 8. 43	Dollars 1.89 1.89 2.22 2.23 2.39 3.68	Dollars 17, 80 18, 93 21, 88 23, 66 26, 64 31, 60	Dollars 1. 42 1. 85 1. 86 1. 86 1. 86 2. 81 2. 81 3. 83	Dollars 16.38 17.08 19.88 21.70 24.69 34.42	Dollars 5.46 1.42 1.90 .90 .60
Com Belt? 17 and mder 18 to 27 28 to 37 28 to 37 28 to 47 48 to 67 68 and over	222 220 220 220 220 220 220 220 220 220	4532554	0222423	8.85 8.85 8.85 8.96 4.94 4.94	44444444444444444444444444444444444444	1.22222 2022 2022 2023 2023 2023 2023	2.1.18 1.1.48 1.1.48 2.1.48	11.2444 46134 46134	¥¥3333	4.0.9.7.7.8 8.282328	114444 138888 138888	25.22.23.23.23.23.23.23.23.23.23.23.23.23.	1.1 1.1. 98.93.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.	15.28 17.82 22.83 22.93 27.53	 85.69.48.48.48.48.48.48.48.48.48.48.48.48.48.
Total or avarage	1, 018	57	88	8.58	2.34	2.61	1.29	2.14	.43	6.12	1.92	20.33	1, 10	19.23	8.
Geographic division: North Atlantic * Bast North Central West North Central South Atlantic South Atlantic South Central	218 762 1, 131 632 803 803	288888	818818	6.71 8.88 8.89 8.89 8.89	25252 25252 25252 25252	81-22-24 81-22-42 81-22-42 81-22-42	111111 8824488	644444 68869 <b>%</b>	523434	222446 2224 2234 2234 233 233 233 233 233 233	82 22 23 23 24 24 24 24 24 24 24 24 24 24 24 24 24	38.92 25.08 17.36 19.06 28.87	24.9.19 28.88 29.28		77
United States	8, 616	88	æ	4.03	2.91	2.78	1.37	3.41	.47	5.31	2.19	22. 47	1.96	20. 61	8.
		-			-			i							

Bureau of Agricultural Economics. From returns to mail inquiry sent to crop reporters. For figures by yield groups for 7 years 1923-1929, see Agriculture Yearbooks, 1924, p. 1136; 1927, p. 1136; 1928, p. 1044; 1830, p. 368, and 1931, p. 1014. For figures by geographical divisions for 7 years, 1923-1929, see June issues of Monthly Supplement, p. 1238; 1926, p. 176; 1925, p. 176; 1925, p. 176; 1925, p. 176; 1925, p. 176; 1925, p. 176; Crops and Markets, June issues, 1927, p. 186; 1929, p. 202; and 1930, p. 220.

Includes miscellaneous labor, irrigation (including water), seed treatment, sacks and twine, crop insurance, use of implements, use of storage buildings, and overhead.
 Form Bate as used here includes Indians, Illinois, Iowa, western Ohio, southeast corner of South Dakota, eastern Nebraska, northeast corner of Kaussa, and the northern three-fourths of Missout.
 Does not include reports from Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connectfort.

Table 468.—Oats: Cost of production by yield groups and geographical divisions, 1930

division Reports  Mumber  1238 249 2412 2412 2412 2412 2412 2412 2413	_				Gross cost	Gross cost per acre				ŧ	Net	Net cost
Number 812 273 249 2419 2419 250 250 250 250 250 250 250 250 250 250		Average yield per acre Propare and plant	Harvest and thresh	Market	Fertilizer and ma- nure	Seed	Land rent	Miscel- laneous 1	Total	Oregic per acre (straw)	Per acre	Per bushel
286 68 63 286 68 63 286 68 63 286 68	<del>                                     </del>	ರ ಪ್ರವರಣಭಾಭವಾಪವನ ಸಭ	ಕ್ಷಣ್ಣಣ್ಣನ್ನು ಕ್ರಮ್ಮ ಕ್ರಮ	\$0 .44444444 44 44	70/2 11/11/11/11/11/11/2 12/2/2/2/2/2/2/2/	Double 2019 2019 2019 2019 2019 2019 2019 2019	00 304444400000000 ಗುರ್	हुनंनंबवववववववव कव	83 2822882288	Dollars 1.0.00 1.1.138831 1.1.28832 1.1.28833 1.2.2.38333 1.4.138333	Dollars 13.09 14.49 14.55 16.55 18.75 18.75 19.85 20.54 21.29 24.59 23.40	Dollars 1.23 1.23 1.25 1.26 1.27 1.27 1.27 1.27 1.27 1.27 1.27 1.27
West North Central 988 84 South Atlantic 304 10 South Central 181 22 Western 78	<b>%</b> 288	8228 44938 4838 83388	**************************************	11.1.1.2%	.81. 4085	1111 463%	4446 888	88288 8828	14.85 22.45 22.34 22.34	2. 83 1. 15 1. 15	14.12 15.13 15.13 11.19	35.82
United States2, 626	83	34 3.26	3.95	1,15	1,38	1.38	6.11	2.37	18, 58	1.60	10.88	. 50

Bureau of Agricultural Economics. From returns to mail inquiry sent to crop reporters. For figures by yield groups for 7 years, 1923, see Agriculture Yearbooks, 1924, p. 1137; 1925, p. 1325, 1927, p. 1143; 1928, p. 1048; 1929, p. 1048; 1929, p. 1048; 1929, p. 1048; 1929, p. 1048; 1929, p. 105; 1929, p. 105; 1929, p. 105; 1929, p. 170; Crops and Markets, 1929, p. 202; 1929, p. 202; 1929, p. 105; 1929, p. 170; Crops and Markets, 1929, p. 202; 1929, p. 202; 1929, p. 105; 1929,

<sup>1</sup> Includes missellaneous labor, irrigation (including water), seed treatment, sacks and twine, crop insurance, use of implements, use of storage buildings, and overhead.

Table 464.—Cotton: Cost of production by yield groups, 1930

		Average	Average					Gross cost per acre	per acre				Credit	Net cost of lint	t of lint
Yield group (pounds of lint per acre)	Reports		yield of lint per acre	Prepare and plant	Culti-	Harvest and market	Fertili- zer and manure	Beed	Ginning	Land	Miscel- laneous <sup>1</sup>	Total	per acre (cotton- seed)	Peracre	Per
100 and under- 101 to 180. 181 to 280. 281 to 340. 841 to 420. 421 and over	Number 213 265 262 111 85	Acres 68 63 72 72 73	Pounds 71 145 226 300 876 642	D00 100 100 100 100 100 100 100 100 100	Dollars 4-61 6-74 5-74 6-89 6-89	Dollars 8, 19 6, 42 7, 46 7, 46 8, 76 13, 63	Doi: 9.00 9.00 9.00 9.00 9.00 14.00 14.00	Dollars 1.06 1.10 1.11 1.13 1.13	Dollar 0.97 1.58 2.70 8.30 5.91	Dollars 4.06 4.70 5.18 5.82 7.08	Dollars 2,21 3,25 3,95 4,77 7,89	Dollars 22, 70 22, 70 33, 96 43, 89 57, 16	Dollars 1.71 2.94 4.61 5.74 6.84 11.83	Dollars 20.99 20.99 20.39 20.29 45.36	Dollars 0.30 1.18 1.13 1.11 1.10

Burean of Agricultural Economics. From returns to mail inquiry sent to crop reporters in all cotton States.

1 Includes miscellaneous labor, irrigation (including water), dusting, picking sacks and sheets, crop insurance, use of implements, use of storage buildings, and overhead.

Table 465.—Cotton: Cost of production by yield groups, 1925-1930

to sharrow, second Electry			Farms r	Farms reporting				Avera	Average yield of lint per acre	of Hint pe	T BCT0			Net c	ost of lin	Net cost of lint per pound	g pui	
Int peracre)	1926	1926	1927	1928	1929	1930	1925	1926	1927	1928	1929	1830	1026	1926	1927	1928	1929	1930
100 and under 101 to 180. 181 to 280. 181 to 280. 841 to 420. 421 and over	Number 126 819 464 212 140 140	Number 123 280 330 1164 1102 81	Number 117 225 314 1184 106 96	Number 136 811 862 167 90 63	Number 204 273 210 101 81 61	Number 213 285 262 111 85 72	Pounds 68 149 228 301 381 506	Pounds 76 148 228 303 882 505	Pounds F 68 149 229 289 381 508	227 227 299 381 512	Pounds 147 147 228 228 280 880 811	Pounds 71 145 226 300 376 542	Cents 30 30 11 12 14 10 0	Cents 20 17 17 17 17 17 17 17 17 17 17 17 17 17	Cents 32 17 17 11 11 11 11 11 11 11 11 11 11 11	Cents 28 17 17 18 10 10	Cents C	Cents 30 16 11 10 10

Bureau of Agricultural Economics. From returns to mall inquiry sent to crop reporters in all cotton States.

1 The average yield of lint cotton in the United States, as estimated by the crop-roporting board, has been as follows: 1925, 167.2 pounds; 1927, 1927

Table 466.—Index numbers of prices paid by farmers, 1910-1930 [Base 1910-1914=100]

		Com	noditie	s used	ın pro	ductio	n	1 to	ht for plus hired	ht for	oduc- main-	erty 8
Year or date	Feed	Machinery	Fertilizer	Building materials for other than house	Equipment and supplies	75	All commodities bought for use in production	Wage rates paid hired labor	Commodities bought for use in production plus wages paid to hired labor	Commodities bought family maintenance	All commodutes bought for use in production and family main-tenance	Taxes on farm property
1910 1911 1912 1918 1914 1915 1915 1916 1917 1918 1919 1921 1922 1922 1922 1924 1926 1927 1928 1928	103 98 129 186 196 208 133 91 118 128 135 145 120 124	Index no. 101 103 100 98 98 101 111 132 160 178 183 175 156 157 158 166 157 158 169 169 159	Index 100. 97 97 102 104 101 113 122 139 159 159 131 122 131 122 131 123 133 132 128	Index no. 100 102 103 101 93 102 118 137 161 189 205 156 159 163 164 161 158	Index no. 101 100 100 100 99 106 129 156 180 179 188 151 131 136 142 131 131 124	Index no	Index no. 98 102 98 102 199 103 121 152 175 142 140 140 144 144 146 146	Index no. 97 97 101 101 102 112 140 176 206 239 150 146 166 168 171 170 169 170 152	Index no. 98 102 99 100 103 119 149 176 189 1447 1447 145 155 155 155 142 142	Index no. 98 100 101 102 107 125 148 180 221 161 162 165 164 161 162 165 161 161 162 161	Index no. 98 101 100 100 101 123 150 156 156 156 156 156 156 156 156 156 156	Index no

Bureau of Agricultural Economics. Compiled from prices reported to the Department of Agriculture by retail dealers throughout the United States. The index numbers include only commodities bought by farmers; the commodities being weighted according to purchases reported by actual farmers in farm management and rural-life studies from 1920 to 1925.

Table 467.—Index numbers of farm prices, 1910-1930: By groups, crop-year averages [August, 1909-July, 1914-100]

Year beginning July	Grams	Fruits and vege- tables	Meat animals	Dairy prod- ucts	Poultry prod- ucts	Cotton and cotton- seed	All groups
1910 1911 1912 1913 1914 1915 1916 1916 1917 1918 1919 1919 1920 1921 1922 1922 1923 1924 1924 1925	226 246 161 102 111 112 155 140 124 136 119	Index no. 96 120 155 165 166 167 175 129 131 131 133 160 119	Index no. 94 88 104 1111 108 1192 2100 1140 1104 1225 1441 148	Index no. 98 101 101 101 98 112 139 162 185 170 187 144 181 189 187	Index 100. 95 95 97 106 104 138 169 194 2217 151 152 141 158 148 146 156 166 166 166 166 166 166 166 166 16	Index 10. 114 814 93 99 69 94 148 224 224 140 129 194 185 166 156 156 156 156 156 156 156 156 15	Index 20. 98 97 103 101 104 146 192 203 220 152 119 132 142 143 133
1929 1930	117 82	169 125	150 112	133 109	152 105	130 79	133 97

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See footnotes, Table 468.

 <sup>1912-1914=100.</sup> Includes food, clothing, household operating expenses, furniture and furnishing, and building materia for house.
 1914=100.

Table 468.—Index numbers of farm prices, United States, 1922-1931
[August, 1909-July, 1914-100]

						-13, 10		<i>'</i> 1					
Group and year	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver- age
GRAINS	Index	Index	Index	Index	Index	Index	Index	Inder	Index	Index	Index	Index	Index
1922 1923 1924 1925 1925 1926 1927 1928 1929 1929 1939 1939	no. 91	no. 102	no. 111	no. 114	20.	no.	no.	no.	no.	no.	no.	no.	no.
1923	113	114	117	121	115 123	111 119	105 112	100 109	97 111	101 113	106 110	111 108	105 114
1924	110	113	114	113	114	116	130	141	140	150	147	155	129
1925	172 143	178 140	172 133	152 131	159	164	152	157	148	135	133	140	156
1927 1	120	122	121	119	131 127	130 140	125 139	128 138	121 134	123 128	121 120	120 123	129 128
1928 1	125	128 123 115	136	144	160	152	142	120	117	116	110	112	130
1929 1	115 118	123	124 107	120 110	113	111	142 122 92	129	131	128	118	119	121
1981 <sup>1</sup>	777	75	74	74	105 74	106 67	92 57	101 54	100 50	92 46	80 57	80 52	100 63
FRUITS AND VEGE-						<b>J.</b>	0.	U2		20	0,	02	03
1922	159	173	181	190	206	197	174	129	109	101	101	104	152
1923	117	122 123	130	146	157	161	165	151	131	123	114	114	136
1924	118 122	123 131	123 138	128 146	132	146	142	138	113	109	108	110	124
1926 *	214	218	220	253	162 240	184 216	178 195	178 166	142 136	152 136	194 142	194 137	160 189
1927 2	140	142	140	147	158	201	195	172	145	138	136	141	155
1928 3	144 109	153 111	174 112	179	181	168	156	137	127	114	109	108	146
1930 2	167	168	169	110 187	119 193	120 193	136 173	160 149	160 148	168	159 114	163 108	136 158
1922 1923 1924 1925 1926 1926 1927 1928 1929 1929 1930 1931	108	109	109	120	119	114	110	97	83	127 70	68	68	98
BLAVINA TAIM													
1922 1923 1924 1925 1926 1928 1928 1929 1939 1931	95	108	118	117	119	121	120	114	112	113	108	107	113
1924	110 101	110 102	110 104	110 106	108 107	103 105	105 103	104 116	112 115	106 121	100 115	98	106 109
1925	123	126	145	146	139	139	148	149	143	141	136	113 136	139
1926	140	146	147	146	148	154	148 152 131	144	148 142	148	142	140	146
1928	140 138	143 139	144 139	143 142	137 151	129 150	131	136 162	142 174	145 160	141 150	138 143	139 150
1929	146	150	160	164	164	163	157 167	165	156	151	144	143	156
1930	146	150	151	116	142	141	127	119	128	123	144 118	112	134
1891	112	106	106	106	99	91	92	92	86	79	76	68	93
DAIRY PRODUCTS	140	104	100	101	100	100	105	100	***				
1923	140 151	134 151	133 148	131 147	126 142	128 142	127 139	129 142	133 145	136 153	140 157	147 155	134 148
1924	152	150	146	134	128	128	123	120	126	130	132	137	134
1925	134	134	187	132	132	130	131 129	135 128	137	146	146	146	137
1927	147 144	143	141	133 140	130 136	128 132	130	128	133 135	134 139	141 141	144 145	136 138
1928	145	143 145	189 142	139	136	134	134 1	129 135	141 139	143	144	146 140	140 140
1929	145	144	144 128	142	136 139	135	135 115	137	139	141	142	140	140
1922 1923 1924 1925 1926 1926 1927 1928 1929 1939	135 107	129 101	101	126 99	123 91	118 86	85	117 87	123 92	125 95	124 95	117 92	123 94
POULTRY PRODUCTS		-02			02			5,		-		52	
1922	176	140	118	110	114	113	111	114	132	159	187	198	139
1923	175	151	130	117	117	114	118	126	144	165	191	198	145
1925	162 213	157 166	109 124	105 127	109 131	115 135	121 141	132 148	144 153 152	176 175	203 208	217 213	147 161
1922 1923 1924 1924 1925 1926 1928 1927 1928 1929 1930	172	145	128	133	135	138	137	137	155	173	202 189 185 200	212	156
1927	173	145	115 122	114	112 128	102	112	122	143 156	167	189	195	141
1929	177 161	144 158	144	121 127	134	127 140	134 143	140 151	165	168 181	200	197 204	150 159
1930	178	154 79	115	117	110	103	101	107	125	129	146 123	127	126 96
1931	110	79	92	90	77	81	83	93	99	110	123	120	96
COTTON AND COTTON-													
1922	129	128	131	135	144	160	166	166	160	168	186	195	156
1928	203 255	215 247	224	222 226	211	207	199	190	204	221	238 179	253	216
1925	182	247 183	219 195	226 189	222 184	219 183	215 186	219 186	175 178	182 171	179	176	211 177
1926	138	142	133	135	130	1 132	126	130	134	94	88	81	122
1927	85	94	102	101	113	119	125	136	179	169	162	153	128 152
1928	152 148	141	147 155	154 152	166 148	162 146	170 145	153 146	142 146	147 141	146 132	148	152 145
1930	128	149 121 76	113	120	119	115	99	94	83	76	80	73	102
1922 1928 1924 1924 1925 1920 1927 1928 1929 1931	72	76	80	78	74	65	71	53	47	42	50	45	63

<sup>1</sup> Kafir omitted.

<sup>2</sup> Onions and cabbage omitted.

Table 468.—Index numbers of farm prices, United States, 1922-1931—Continued [August, 1909-July, 1914-100]

Group and year	Jan.	Feb.	Mar.	Apr.	Мау	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver-
ALL GROUPS  1922 1923 1924 1925 1926 1928 1928 1929 1929 1929 1930 1931	Index no. 114 134 137 146 143 126 137 133 134	Index no. 118 136 146 143 127 135 136 131 90	Index no. 123 136 131 151 140 126 137 140 126 91	Index no. 123 137 130 147 140 125 140 138 127 91	Index no. 127 135 129 146 139 126 148 136 124 86	Index no. 128 133 130 148 139 130 145 135 123 80	Index no. 126 130 132 149 136 130 145 140 111	Index no. 120 128 139 152 133 132 139 143 108	Index no. 119 132 132 144 140 141 141 111 72	Index no. 123 134 138 143 130 139 137 140 106	Index no. 126 136 137 144 130 137 134 136 103	Index no. 131 137 139 143 127 137 134 135 97 66	Index no. 124 135 134 147 130 131 109 138 117 80

Bureau of Agricultural Economics. Prices of farm production received by producers collected monthly from a list of about 12,000 special price reporters. This list is made up almost entirely of country-town dealers, elevator managers, buyers, and merchants.

The commodities by groups are as follows: Grains—wheat, corn, oats, barley, rye, kafir; fruits and vegetables—apples, oranges, grapefruit, potatoes, sweetpotatoes, beans, onions, cabbage; meat animals—beef cattle, calves, hogs, sheep, lambs; dairy products—butter (represents butter, butterfat, and cream), milk; poultry products—chickens, eggs; cotton and cottonseed; all groups includes also horses (represents horses and mules), hay, flax, tobacco, and wool.

Table 469.—Index numbers of general trend of prices and wages 1910-1931 [1910-1914-100]

	Whole- sale prices	Indus-	Prices : for co in—	paid by mmodit	farmers les used	Farm	
Year and month	of all com- modi- ties i	trial wages 2	Living	Pro- duction	Living and produc- tion	Index no. 97 101 102 112 140 176 166 168 170 169 170 169 170	Taxes*
	Index	Index	Index	Index	Index	Inder	Index
	no	710.	20.	no.	70.		no.
1910	103		98	98	98		
1911	Ω5		100	103	101		
1912	101		101	98	100		
1913	102		100	102	100		
1914	99		102	99	101		100
1915	102	101	107	103	106		102
1916	125	114	125	121	123		101
1917	172	129	148	152	150		106
1918	192	160	180	176	178		118
1919	202	185	214	192	205		130
1920	225	222	227	175	206		155
1921	142	203	165	142	156		217
1922	141	197	160	140	152		232
1923.	147	214	161	142	153		246
1924	143	218	162	143	154		249
1925	151	223	165	149	159		250
1926	146	229	164	144	156		253
1927	139	231	161	144	154		258
1928	141	232	162	146	156		263
1929	139	236	160	146	155		267
1930	126	226	151	140	146	152	266
1021	107	230	101	140	140	102	200

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<sup>3</sup> Kafir, onions, and cabbage omitted.

<sup>&</sup>lt;sup>1</sup> Burean of Labor Statistics. Index obtained by dividing the new series, 1926≈100, by its pre-war average

 <sup>1910-1914, 68.5.</sup> A verage weekly earnings, New York State factories. June, 1914=100.
 Index of estimate of total taxes paid on all farm property. 1914=100.

Table 470.—Estimated average property tax per acre on farm real estate, by geographic divisions, and United States, 1924–1930

Geographic division	1924	1925	1926	1927	1928	1929	1930
New England Middle Atlantic East North Central West North Central South Atlantic East South Central West South Central Mountain Pacific United States	Dollars 0. 95 1. 17 1. 34 69 46 45 . 32 . 22 . 92	Dollars 0.96 1.21 1.34 .68 .48 .45 .32 .23 .93	Dollars 1. 00 1. 20 1. 25 69 51 46 32 23 95	Dollars 1. 03 1. 22 1. 28 . 70 . 52 . 46 . 33 . 23 . 97	Dollars 1. 05 1. 22 1. 37 -71 -52 -47 -34 -23 1. 01	Dollars 1. 07 1. 23 1. 40 . 72 . 54 . 48 . 35 . 24 1. 01	Dollars 1, 10 1, 24 1, 38 .73 .52 .48 .36 .24 1, 02

Bureau of Agricultural Economics. Average tax per acre in 1924 based on the 1925 Census of Agriculture. Trends in the United States as a whole and in each geographic division since 1924 are based on weighted averages of replies to questionnaires sent each year to farmers in all parts of the country.

TABLE 471.—Farm wage rates: Averages and index numbers, 1866-1931 [1910-1914=100]

		verage arm v			wage rate	мадев		A	verage farm v	year vage 1	ly	wage rate	wages
Year	Pomon		Poday		erage wa nonth 1	rs of farm	Year	P mon		P da;		erage wa	rs of farm
	With board	Without	With board	Without	Weighted average yer month	Index numbers of farm wages		With board	Without	With board	Without	Weighted average yer month	Index numbers of farm wages
1866 *	10. 09 9. 97 11. 16 10. 86 11. 70 12. 32 12. 88 13. 08 13. 29 13. 48 13. 85 12. 70 12. 75 13. 29 13. 90 15. 51 18. 73 20. 48 19. 58	16.79 17.53 18.52 19.11 19.22 19.67	0. 64 .63 .68 .61 .64 .70 .71 .72 .72 .73 .72 .65 .61 .71 .75 .83 1. 03 1. 04 1. 07	0.90 .87 .94 .89 .97 .98 .97 .98 .97 .98 .97 .98 .91 .99 1.32 1.31 1.40	Dols. 13. 14 12. 93 14. 19 13. 34 14. 14 14. 82 15. 58 15. 87 16. 06 15. 93 14. 60 14. 69 15. 58 16. 34 18. 12 21. 92 23. 00 23. 08	59 56 59 62 65 66 67 67 61 62 65 68 76 93 97	1912	20. 46 21. 27 20. 90 21. 08 23. 64 35. 12 40. 14 47. 24 30. 25 29. 31 33. 88 34. 86 34. 58 34. 58	Dols. 29. 14 29. 72 29. 72 29. 72 29. 72 29. 73 25. 58 40. 19 49. 13 56. 77 65. 05 43. 56 44. 56 48. 65 44. 56 35. 03	1. 12 1. 15 1. 11 1. 12 1. 24 1. 56 2. 05 2. 24 1. 66 1. 64 1. 91 1. 88 1. 88 1. 88 1. 88 1. 91	1.44 1.48 1.44 1.60 2.61 3.56 2.17 2.44 2.44 2.44 2.44 2.44 2.44 2.44 2.4	Dols. 24. 01 24. 83 24. 26 26. 83 33. 42. 12 49. 11 57. 01 57. 01 53. 72 40. 13 40. 60 40. 60 40. 64 40. 64	104 101 102 112 140 176 206 239 150 146 166 168 171 170 169 170

Bureau of Agricultural Economics.

<sup>1</sup> Yearly averages are from reports by crop reporters, giving average wages for the year in their localities.
2 This column has significance only as an essential step in computing the wage index.
3 Years 1866 to 1878 in gold.
4 1877 or 1878, 1878 or 1879 (combined).
5 Weighted average of quarterly reports, April (weight 1), July (weight 5), October (weight 5), and January of the following year (weight 1).

Table 472.—Male farm labor, by geographic divisions, quarterly, 1931

Division .	Per	r mon boo		ith	Per:	mont! bo	n, wit	hout	P	er da; boa	y, wit rd <sup>1</sup>	h	Per		with ard 1	out
	Jan.	Apr.	July	Oct.	Jan.	Apr.	July	Oct.	Jan.	Apr.	July	Oct.	Jan.	Apr.	July	Oct.
N. Cent., East N. Cent., West South Atlantic South Central Western	36, 59 29, 33 27, 82 19, 53 19, 34 42, 65	36, 22	36, 13 29, 05 31, 02 17, 58 17, 88 40, 17	34.50 27.15 27.51 16.07 16.40 36.95	58, 65 43, 51 41, 11 28, 93 28, 69 63, 73	56, 86 43, 03 44, 87 26, 44 26, 64 65, 02	55. 47 41. 30 42. 14 26. 17 25. 99 61. 84	54. 34 38. 89 38. 15 23. 88 23. 78 55. 83	2.19 1.64 1.60 1.00 .95 1.98	2.11 1.58 1.63 .90 .89 1.96	2.09 1.52 1.54 .91 .88 1.81	2.00 1.42 1.35 .82 .80 1.69	2. 99 2. 20 2. 21 1. 37 1. 25 2. 75	2. 86 2. 15 2. 24 1. 23 1. 16 2. 73	2,06	2.70 1.89 1.87 1.08 1.07 2.32

Bureau of Agricultural Economics. As reported by field and crop reporters.

TABLE 473.—Farm real estate: Index numbers of estimated value per acre, by geographic divisions, 1912-1931 1

[1912-1914=100 per cent]

Geographic division	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
New Eng	In- dex no. 99 93 97 97 98 97 96 98 94	In- dex no. 101 100 100 100 100 100 102 99	103 103 103 103 104 100	99 100 104 105 98 99 100 98	dex no. 102 104 110 114 105 109 103	dex no. 112 116 122 119 120	dex no. 117 127 127 134 135 140 134 117	dex no. 123 121 135 147 161 162	136 161 184 198 199 177 151	dex no. 135 127 151 174 163 159 133	no. 134 118 132 150 146 149 136 122	dex no. 130 116 128 142 152 149 132	dex no. 128 114 121 132 151 142 136 110	no. 127 114 116 126 148 141 144 105	dex no. 128 113 111 121 149 144 103	no. 127 111 104 115 137 133 139 101	In- dex no. 127 110 101 113 134 130 137 101 142	100 112 132 129 136 101	dex no. 127 106 96 109 128 128 136 102	101 87 97 116 117 121 100
United States	97	100	103	103	108	117	129	140	170	157	139	135	130	127	124	119	117	116	115	106

Bureau of Agricultural Economics. Based on values as reported by crop reporters. Values as reported by the census for 1910, 1920, and 1925 will be found in Table 511 of the 1927 Yearbook.

<sup>&</sup>lt;sup>1</sup> Includes piecework.

<sup>&</sup>lt;sup>1</sup> All farm land with improvements, as of Mar. 1. Owing to rounding of figures, 1912–14 will not always equal exactly 100 per cent.

Table 474.—Number of farms per 1,000 changing ownership by various methods, by geographic divisions, 12 months ended March 15, 1928-1931

								_							
Geographic division	Vol	unte ti	ry sal	es e	and				and r s, tota	elated d	Inh	erit	anc	e and	gift
Cloughapano es randa	1928	192	9 19	30	1931	1928	192	29	1930	1931	1928	19:	29	1930	1931
New England	33.7 24.0 23.9 20.0 27.5 27.9 34.8 34.3	No. 28. 21. 22. 18. 23. 25. 28. 23.	7	7072892927	No. per 1,000 30. 7 24. 5 18. 6 18. 9 14. 5 19. 4 16. 7 24. 8 22. 1	No. per 1,000 10.7 11.8 20.7 32.4 23.8 20.0 18.5 39.4 19.9	1,00 10. 12. 19. 25. 23. 15. 15. 17.	70901902215	No. per 1,000 11. 2 13. 1 22. 3 27. 5 23. 2 16. 1 16. 8 29. 4 15. 2 20. 8	25.0	No. per 1,000 10.4 8.6 9.7 8.4 10.6 9.2 7.8 5.6 7.1	8 8 10 8 7 6	r	No. per 1,000 10.3 8.2 9.4 9.8 11.4 9.3 7.6 7.0 7.3	8.8 8.5 9.3 9.7 12.5 9.9 7.4 6.9 6.6
Geographic divisio	n		Adn	ini	strator sa	s' and	exe	cut	ors'		Total	, all	cla	ases ³	
	_		1928		1929	193	30	1	931	1928	192	9	19	930	1931
New England Middle Atlantic East North Central West North Central South Atlantic East South Central West South Central West South Central Mountain Pacific			8. 8. 6. 7. 6. 4.	1 2 3 5 9	No. pe 1,000 6. 5 7. 2 6. 1 7. 5 4. 1 3. 7	1,0	per 00 6. 1 7. 0 7. 8 8. 2 7. 9 5. 8 3. 3 4. 7 3. 6		5. 6 7. 0 7. 5 5. 4 6. 5 5. 6 3. 6	No. per 1,000 64. 1 64. 1 63. 9 72. 7 62. 9 64. 4 59. 6 85. 4	1,00 58 56 57 64 60 53 52		1,	per 000 50. 2 58. 0 61. 6 68. 0 62. 7 56. 5 53. 3 81. 7 57. 6	No. per 1,000 56. 1 55. 5 60. 9 66. 8 62. 6 51. 6 72. 8 58. 1
United States			6	7	5.4		6.1	Γ	5.7	66.0	58	3.0		61.5	61.9

Bureau of Agricultural Economics. Based on returns from crop reporters.

Including contracts to purchase (but not options).
 Includes all other sales in settlement of estates.
 Indluding miscellaneous and unclassified.

Table 475.—Bankruptcies among farmers, number and percentage of total, by geographic divisions, fiscal years ended June 30, 1910-1930

	New E	ngland	Mid Atla		East 1 Cen	North itral		North tral	South A	tlantic
Year	Bank- rupt- cles among farmers	Per cent of total bank- rupt- cies	Bank- rupt- cles among farmers	Per cent of total bank- rupt- cles	Bank- rupt- cles among farmers	Per cent of total bank- rupt- cies	Bank- rupt- cles among farmers	Per cent of total bank- rupt- cles	Bank- rupt- cies among farmers	Per cent of total bank- rupt- cies
910 911 912 913 914 915 916 917 918 919 919 920 922 922 922 923 924 925 927 927 928 929 929 929 920 921 922 923 924 925 927 928 929 929 929 920 921 922 923 924 925 926 927 928 929 929 929 920 920 921 922 923 924 925 926 927 928 929 929 929 920 920 920 921 922 923 924 925 927 928 929 929 929 929 929 920 920 920	123 85 148 81 88 112 143 152 125 104	Per cent 6.0 4.4 7.4 6.0 4.8 6.3 4.3 6.2 6.9 4.9 4.8 6.2 6.3 6.2 6.3 6.2 6.3 6.3 6.3 6.3 6.3 6.3 6.3 6.3 6.3 6.3	Number 52 48 58 58 66 63 990 91 77 14 14 224 224 274 270 305 353	Per cent 1.6 1.7 1.8 2.0 2.4 2.2 2.4 2.2 2.3 2.6 3.1 2.6 3.5 2.6 3.6 3.6 3.6 3.6	Number 98 98 98 98 91 43 91 94 46 142 126 75 83 652 247 750 684 7719 973 1,025	Per cent 3.4 2.7 5.0 2.8 3.9 3.6 3.6 3.6 9.0 11.5 12.2 9.3 9.3 8.6 8.0 8.1	Number 287 167 219 268 289 290 276 325 267 156 213 324 1,066 2,005 2,785 2,889 2,404 1,729 1,257 1,010	Per cent 15.9 11.0 14.2 13.7 14.6 13.8 12.6 13.6 11.4 8.1 12.0 40.3 46.1 39.2 35.4 30.3 24.2 21.2 21.2 17.9	Number 63 78 78 79 85 100 127 369 407 407 678 91 1 687 745 585 685 515 491 455	Per cent 4.5 5.1 4.5 5.5 10.1 13.7 17.0 17.0 17.0 19.9 7.6 5.8
		South itral		South tral	Mou	ntain	Pa	cific	United	States
Year	Bank- rupt- cles among farmers	Per cent of total bank-rupt-cles	Bank- rupt- cles among farmers	Per cent of total bank-rupt-cies	Bank- rupt- cles among farmers	Per cent of total bank- rupt- cles	Bank- rupt- cies among farmers	Per cent of total bank-rupt-cies	Bank- rupt- cies among farmers	Per cent of total bank- rupt- cies
1910	38 65 91 83 100 127 164 184 179 126 108 100 201 420 483	Per cente 5.37 1 4.2 4.8 8.3 5.5 6.8 9 9 1 7 7 5 7 9 9 5 7 9 5 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	Number 72 62 80 97 178 217 186 164 95 124 224 254 559 788 650 764 484 375 2252 225	Per cent 8.3 7.0 7.4 6.8 9.3 12.2 114.9 10.07 19.5 20.4 22.3 23.6 20.7 19.5 11.3 11.7	Number 35 35 55 66 118 159 102 102 104 177 419 730 1,040 1,071 1,142 280 220 201	Per centi 7.1 7.0 9.1 8.9 15.7 19.2 17.4 11.9 16.2 23.8 38.2 43.3 41.8 42.7 31.8 24.0 9 17.1	Number 87 40 447 711 115 156 137 1100 86 97 192 424 458 453 387 326 255	Per cent 9.02 4.6 5.4 6.9 6.9 6.1 7.3 6.7 5.8 6.9 7.2 11.0 16.8 10.0 8.5 6.1 4.6	Number 849 679 837 937 937 937 1, 245 1, 245 1, 265 1, 267 937 7, 772 7, 779 6, 236 4, 4023	Per cent 5. 7

Bureau of Agricultural Economics. Compiled from annual reports of the Attorney General.

Table 476.—Population: Total population, number and percentage of total population living in rural areas, and percentage of all gainfully employed persons 10 years or older engaged in agricultural pursuits, census years, 1790–1930

		Rura	d populati	on living—	•	Percent- age of all
Census years	Total popu- lation	Outside of inc places of 8,000		Outside of incor- porated places of 2,500 or more	On farms	gainfully employed persons
1790 1800 1810	Number 3, 929, 214 5, 308, 483 7, 239, 881	Number 3,797,742 5,097,610 6,882,961	Per cent 96. 7 96. 0 95. 1	Per ceni	Per cent	Per cent
1820	9, 638, 453 12, 866, 020 17, 069, 453	9, 163, 318 12, 001, 511 15, 615, 459	95. 1 93. 3 91. 5 87. 5			83. 1 77. 5
1860 1870 1880	22, 191, 876 31, 443, 321 38, 558, 371 50, 155, 783	20, 294, 290 26, 371, 065 30, 486, 496 38, 790, 085	83. 9 79. 1 77. 4	71.4		47. 5 44. 3
1890	62, 947, 714 75, 994, 575 91, 972, 266 105, 710, 620 122, 775, 048	44, 703, 475 50, 976, 240 56, 401, 932 59, 402, 980 62, 441, 594	71. 0 67. 1 61. 3 56. 2 50. 9	64.6 60.0 54.2 48.6 43.8	34. 7 29. 5 24. 6	39. 2 35. 7 33. 2 26. 3 21. 5

Bureau of Agricultural Economics. Compiled from reports of Bureau of the Census.

TABLE 477 .- Population: Total, urban, rural-farm, and rural nonfarm by geographic divisions, census years, 1920, 1930

Geographic	То	tal	Urb	an 1	Rural-	farm :	Rural-no	onferm *
divisions	1920	1930	1920	1930	1920	1930	1920	1930
New England	13, 990, 272 8, 893, 307 10, 242, 224 3, 336, 101 5, 586, 871	26, 260, 750 25, 297, 185 13, 296, 915 15, 793, 589 9, 887, 214 12, 176, 830 3, 701, 789 8, 194, 433	16, 672, 595 13, 049, 272 4, 727, 872 4, 338, 792 1, 994, 207 2, 970, 829 1, 214, 980 3, 471, 483	2, 778, 687 4, 427, 439 1, 457, 922 5, 534, 881	1, 861, 161 4, 887, 204 5, 153, 183 6, 397, 757 5, 174, 806 5, 210, 570 1, 152, 998 985, 544	1, 673, 694 4, 453, 114 5, 035, 561 5, 878, 956 5, 084, 435 5, 307, 939 1, 123, 693 1, 101, 038	8, 539, 067 2, 663, 694 3, 253, 723 1, 724, 294 2, 060, 825 968, 128 1, 109, 844	4, 192, 349 4, 049, 163 2, 705, 173 4, 216, 511 2, 024, 092 2, 441, 452 1, 120, 174 1, 558, 514
United States.	105, 710, 620	122, 775, 046	54, 304, 603	68, 954, 823	31, 358, 640	30, 157, 518	20, 047, 377	23, 662, 710

Bureau of the Census.

<sup>&</sup>lt;sup>1</sup>Some changes in classification of occupations occurred during this time so that the figures are not strictly comparable. In general, however, the trend is indicated closely.

Persons living in incorporated places of 2,500 or more.
 Persons living on farms located outside of incorporated places of 2,500 or more.
 Persons living outside of incorporated places of 2,500 or more who do not live on farms.

Table 478.—Number of farms, land in farms, harvested acreage, and land in harvested crops, census years

	ž	Number of farms	- BE		Land in farms		Harvested	Land in harvested	ested crops
State and division	1020	1926	1930	1920	1925	1930	acrenge, <sup>1</sup> 1919	1924	1929
Maine	25, 22, 22, 22, 23, 24, 25, 20, 21, 22, 20, 21, 22, 20, 21, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20	25, 25, 25, 25, 25, 25, 25, 25, 25, 25,	39, 006 14, 906 24, 898 25, 598 17, 136	Acres b, 425, 968 2, 603, 806 4, 234, 811 2, 494, 477 331, 600 1, 898, 980	Acres 5, 161, 428 2, 262, 064 3, 926, 683 2, 387, 629 309, 013 1, 83, 110	4,630,938 1,960,061 3,896,097 2,003,461 1,603,279	Acres 1, 648, 521 641, 496 1, 186, 020 667, 082 74, 316 511, 848	Acres 1, 605, 676 523, 886 1, 127, 004 625, 008 68, 368 497, 436	Acres 1, 304, 014 880, 105 1, 073, 908 474, 167 65, 214 872, 147
New England	156, 564	159, 489	124, 925	16, 990, 642	15, 857, 927	14, 283, 197	4, 622, 283	4, 447, 837	3, 659, 340
New York. New Jarsey. Panagyyania.	183, 196 29, 702 202, 250	188, 764 29, 671 200, 443	159, 806 25, 378 172, 419	20, 632, 803 2, 282, 585 17, 667, 513	19, 269, 920 1, 924, 545 16, 296, 468	17, 979, 633 1, 768, 027 15, 309, 485	8, 788, 658 1, 003, 174 8, 308, 144	8, 290, 336 907, 754 7, 283, 511	6, 958, 936 776, 954 6, 587, 707
Middle Atlantic	425, 147	418, 868	357, 603	40, 572, 901	87, 490, 939	35, 047, 145	18, 279, 970	16, 481, 600	14, 323, 597
Ohlo. Indiana Illnois. Michigan Wisconsin.	256, 695 205, 126 237, 181 196, 447 189, 295	244, 703 195, 786 225, 601 192, 327 193, 156	219, 296 181, 570 214, 497 169, 372 181, 767	23, 516, 888 21, 063, 332 81, 974, 776 19, 032, 961 22, 148, 223	22, 210, 248 19, 915, 120 30, 731, 947 18, 035, 290 21, 850, 853	21, 514, 069 19, 688, 676 30, 695, 330 17, 118, 961 21, 874, 155	12, 448, 866 12, 325, 426 20, 943, 321 9, 632, 720 9, 790, 136	10, 703, 042 10, 615, 744 19, 755, 447 8, 501, 903 9, 538, 023	10, 115, 652 10, 213, 813 18, 958, 337 7, 738, 221 9, 618, 331
East North Central	1, 084, 744	1,061,572	966, 502	117, 735, 179	112, 752, 458	110, 891, 179	66, 140, 469	69, 114, 159	56, 644, 354
Minnesota	178, 478 213, 439 263, 004 77, 690 74, 637 124, 417 165, 286	188, 221 213, 490 280, 473 76, 970 79, 537 127, 734 165, 879	186, 256 214, 928 226, 940 77, 975 83, 167 129, 468 166, 042	80, 221, 768 83, 474, 896 34, 774, 670 86, 214, 761 34, 636, 491 42, 225, 475 45, 425, 170	80,069,137 83,280,813 82,641,893 84,327,410 82,017,986 42,024,775 43,720,129	80, 913, 867 84, 019, 383 33, 743, 019 38, 657, 894 86, 470, 083 44, 708, 665 46, 975, 647	16, 781, 770 21, 216, 389 16, 983, 363 10, 649, 376 16, 092, 743 19, 295, 288 22, 279, 272	17, 929, 704 21, 466, 350 13, 720, 574 19, 877, 233 15, 792, 987 19, 810, 362 22, 381, 618	18, 445, 306 22, 275, 886 13, 175, 947 21, 254, 660 17, 856, 178 21, 396, 340 24, 308, 361
West North Central	1, 096, 951	1, 111, 314	1, 112, 755	256, 973, 229	248, 081, 143	265, 487, 907	130, 298, 190	130, 978, 827	138, 715, 660
Delaware Maryland District of Columbin. Virginis west Virgini. North Carolina.	10, 140 47, 908 186, 242 87, 289 269, 763 192, 693	10, 257 49, 001 193, 723 90, 380 283, 482 172, 767	9, 707 43, 208 100, 610 82, 641 279, 708 167, 931	944, 511 4, 767, 989 5, 668 18, 561, 112 9, 569, 790 20, 021, 736 12, 428, 676	899, 641 4, 453, 398 17, 210, 174 8, 979, 847 18, 603, 670	900, 815 4, 374, 386 16, 728, 620 8, 802, 348 18, 665, 103 10, 383, 113	484,901 2,110,741 2,288 5,088,671 2,181,903 6,178,583 5,672,568	404, 208 1, 777, 513 8, 988, 570 1, 676, 570 5, 574, 921 4, 311, 138	407, 609 1, 741, 616 1, 737 3, 976, 307 1, 655, 380 5, 809, 741 4, 136, 890

ÖĒ	Georgia Findia	310, 732 54, 005	249, 095	255, 598	25, 441, 061 6, 046, 6v1	21, 945, 496 5, 864, 519	22, 078, 630 5, 026, 617	11, 415, 550 1, 553, 615	8, 127, 577 1, 369, 050	8, 337, 145 1, 454, 254
i	South Atlantic	1, 158, 976	1, 108, 061	1,063,468	97, 775, 243	88, 569, 458	86, 362, 715	84, 493, 659	27, 211, 743	27, 519, 597
ষ্ট্ৰ≱ 10044€	4 1 1 1	270, 628 252, 774 256, 099 272, 101	258, 524 252, 669 237, 631 257, 228	246, 409 245, 667 267, 386 312, 663	21, 612, 772 19, 510, 856 19, 576, 856 18, 196, 979	19, 913, 104 17, 961, 139 16, 739, 139 16, 063, 243	19, 927, 286 18, 003, 241 17, 554, 635 17, 332, 195	6, 773, 958 7, 153, 509 7, 836, 064 6, 603, 072	5, 183, 702 6, 209, 428 6, 641, 355 5, 661, 671	5, 330, 821 6, 106, 300 7, 113, 937 6, 597, 112
	East South Central	1, 061, 600	1,006,052	1, 062, 214	78, 897, 463	70, 606, 625	72, 817, 357	28, 366, 603	23, 696, 156	25, 148, 170
	Arkansas Louislana. Oklahoma. Tara	232, 604 185, 463 191, 988 436, 033	221, 991 132, 450 197, 218 465, 646	242, 334 161, 445 203, 866 495, 489	17, 456, 750 10, 019, 822 31, 951, 934 114, 020, 621	15, 632, 489 8, 837, 502 80, 868, 965 109, 674, 410	16, 052, 962 9, 356, 437 33, 790, 817 124, 707, 130	6, 715, 048 4, 022, 244 15, 339, 040 25, 467, 351	6, 226, 830 3, 484, 753 14, 548, 683 27, 074, 869	6, 581, 834 4, 068, 151 15, 563, 185 30, 634, 370
58	West South Central	906, 088	1, 017, 305	1, 103, 134	173, 449, 127	165, 013, 316	183, 906, 346	51, 543, 683	61, 335, 135	56, 837, 540
ZY¥0Z∢PZ	Montana Gabo Wyoming Colorado New Macko Aritona Utah	57, 677 42, 106 15, 748 85, 934 25, 934 25, 945 3, 163	46, 904 14, 562 14, 512 31, 687 10, 803 8, 883 8, 883	47, 495 41, 674 16, 011 56, 956 31, 404 27, 159 3, 449	35, 070, 656 8, 376, 873 11, 809, 351 24, 402, 014 24, 406, 633 6, 802, 128 5, 050, 410 2, 357, 163	32,735,728 8,116,147 18,663,308 24,167,270 27,850,325 11,065,291 5,000,724 4,040,586	44, 689, 152 9, 346, 908 23, 526, 234 28, 876, 171 30, 822, 034 10, 526, 627 6, 613, 101 4, 080, 906	3, 911, 989 2, 784, 908 1, 198, 226 5, 327, 378 1, 179, 198 1, 108, 572 3, 92, 827	6, 416, 335 2, 578, 789 1, 572, 625 1, 345, 705 1, 024, 666 1, 024, 666 362, 552	7, 840, 979 3, 150, 097 2, 007, 751 6, 750, 388 1, 493, 998 1, 478, 411 1, 159, 890
i	Mountain	244, 109	233, 392	241, 314	117, 887, 226	181, 689, 374	157, 450, 133	16, 307, 321	19, 705, 967	23, 279, 028
FOC	Washington Westington California	66, 288 50, 206 117, 670	73, 267 55, 911 136, 409	70, 904 55, 153 135, 676	13, 244, 720 13, 542, 818 29, 366, 667	12, 610, 310 14, 130, 847 27, 516, 955	13, 533, 778 16, 548, 678 30, 442, 581	4, 228, 636 2, 968, 458 6, 840, 656	8, 262, 824 2, 592, 219 5, 722, 800	3, 658, 514 2, 906, 324 6, 549, 967
,	Pacific	234, 104	265, 587	261, 733	56, 152, 705	54, 258, 112	60, 525, 037	14, 037, 750	11, 577, 843	13, 114, 805
	United States	6, 448, 343	6, 371, 640	6, 288, 648	955, 883, 715	924, 319, 352	086, 771, 016	363, 069, 933	344, 540, 287	350, 242, 091

Bureau of Agricultural Economics. Compiled from reports of the Bureau of the Census. Some land was double cropped.

Table 479.—Number of farms by tenure of operator and percentage of all farms operated by tenants, 1920 and 1930

		Owner ope	erators		Man	agers
Geographic division and State	Full o	wners	Part o	wners		
	1920	1930	1920	1930	1920	1930
New England:	Number	Number	Number	Number	Number	Number
Maine	44, 224 17, 836	85, 468	1, 213 768	1, 280 789	786 546	50 35
New Hampshire	23, 928	12, 966 20, 662	1, 195	1.347	568	48
Massachusetts	26, 515	21,410	1, 572	1,788	1,627 205	95
Massachusetts Rhode Island Connecticut	2,971	21, 410 2, 523 14, 271	274 1, 297	285 1,315	205	9
Connecticut Middle Atlantic:	18, 369	14, 2/1	1, 201		1,070	54
New York	139, 153	124, 206	12, 564	11,835	4, 376	2, 65
New Jersey Pennsylvania East North Central:	20, 752	19, 564 134, 423	1, 137	1, 207 7, 860	987	65
Pennsylvania	144, 698	134, 423	8, 800	7,860	4, 490	2,74
Obje	157, 116	136, 332	20, 870	23, 517	3, 065	1,84
Ohio Indiana	112, 664 100, 903	97. 5p3	24, 546	23, 517 27, 964	2,329	1, 47 2, 12
Illinois	100, 903	85, 069	31, 671	34,823	3, 411 2, 319	2, 12 1, 53
Wisconsin	139, 874 149, 390	118, 928 132, 778	19, 532 10, 220	34, 823 22, 719 14, 209	2, 427	1, 65
Illinois	. 1		1	i		
	112, 880	97, 878	19, 884	28, 692	1, 596	1,04
Miseauri	99,008	85, 272 127, 989	22, 880 31, 178	26,061 37,329	2, 487 2, 247	1, 98 1, 54
North Dakota	153, 852 84, 051 27, 253	23, 807 22, 372	22,866	26, 298	855	47
Iowa Missouri North Dakota South Dakota	27, 253	22, 372	20.562	37, 329 26, 298 23, 237	781	45
Nebraska Kansas	50, 565 65, 640	43, 801 57, 151	19, 107 31, 450	24, 117 87, 611	1,315 1,495	1,02
			1	31,011	1, 200	~
Delaware  Maryland District of Columbia  Virginia.  West Virginia.  North Carolina South Carolina Georgia  Florida	5, 688 30, 842	5, 816 28, 333	322	444	144	16
Maryland	30, 842 91	28, 333 53	1, 963	2,490	1, 262 19	93
Virginia	101 484	104, 956	14, 909	14 140	2, 134	1, 53
West Virginia.	66, 220	60, 581	5, 881 19, 529	5,992	1,090	1 72
North Carolina	131, 847	60, 581 115, 765 45, 515	19, 529	25,680	928	64
Georgia	66, 220 131, 847 60, 089 94, 575	70, 596	7, 635 7, 548	5, 992 25, 680 8, 955 9, 206	738 1,655	69 1, 40
Florida East South Central:	35, 757	35, 485	2, 730	3,909	1,829	2,83
East South Central:	170 000	101 011		00 100	000	
Kennesse	159, 206 129, 532	100, 210	20, 121 18, 550	22,188	969 807	67 61
Kentucky. Tennessee. Alabama Mississippi. West South Central:	95, 548	135, 215 109, 853 75, 144 77, 382	11, 541	22, 188 21, 673 15, 228	741	60
Mississippi	83, 768	77, 382	7,542	8, 665	989	99
West South Central:	98, 037		14 610	18 412	736	63
Arkansas Louisiana	51.895	72, 597 46, 893	14, 610 5, 859	6, 266	828	73
Oklahoma Texas	69, 786	53, 647	23, 431 29, 783	16,412 6,266 24,067	935	82
Monatoin	171, 427	152, 852	1	37,663	2, 514	3, 31
Montana	38, 431	20, 101	11, 840 4, 348 2, 722 9, 738	15, 252 6, 318 4, 299	899	51
Idaho	30, 299	20, 101 24, 194	4,348	6,318	758	60
Wyoming	10, 081 35, 553	7, 896 26, 929	2,722	4,299	377 880	29 83
New Mexico	21, 533	19, 930	4, 223	11,497 4,810	433	33
Montana	6, 970	9, 727 19, 046	899	1, 567	305	54
	19, 134 2, 493	19,046 2,464	3, 445 206	4, 562 306	296	23 22
Nevada Pacific:	4, 490		200		168	1
Washington Oregon California	44, 832 33, 300	49, 702 36, 674 90, 375	7, 869	7, 886 7, 847 18, 181	1, 168 916	1, 23
Oregon	33, 300	36, 674	6, 563	7,847	916	1 84
New England	75, 882 133, 841	107, 300	11, 698 6, 319	18,181	4,949	7, 76 2, 93
New England Middle Atlantic East North Central West North Central	304, 603	278 193	22,501	6, 804 20, 902	4, 802 9, 853	6, 0
East North Central	659, 947 543, 249	570, 660 457, 770 467, 100	106, 839	123, 232 203, 845	13, 551	6, 05 8, 63
west North Central	543, 249 546 542	457, 770	167, 907	203, 845	10, 776 9, 799	3 7 A
East South Central	546, 563 468, 054	397, 594	60, 526 57, 754	72, 830 67, 754	8, 799 8, 506	8, 96 2, 80
West South Central	391, 145	325, 989	73, 183 37, 421	84,408	5, 013	2, 88 5, 50
west North Central South Atlantic East South Central West South Central Mountain Pacific	165, 094 154, 014	130, 287 176, 751	37, 421 26, 130	48, 611 28, 864	4, 116 7, 033	3, 59 9, 84
				20, 80%	7, 058	9, 84
United States	3, 366, 510	2, 911, 644	558, 580	656, 750	68, 449	55, 88

Table 479.—Numbers of farms by tenure of operator and percentage of all farms operated by tenants, 1920 and 1930—Continued

			Tena	nts		
Geographic division and State	Southern	croppers	Tenants, i	including pers	Percenta fari	ge of all ns
	1920	1930	1920	1930	1920	1930
lew England:	Number	Number	Number	Number	Per cent	Per cent
Maire New Hampshire Vermont Massachusetts			2, 004 1, 373	1, 755 796	4.2 6.7 11.6 7.1	4.
New Hampshire			1,373	796	6.7	5. 1 9. 1
Massachusetts			3, 386 2, 287	2, 409 1, 442	71	5.
Rhode Island Connecticut			633	415	15.51	12.
Connecticut			1,919	1, 068	8.5	6.
iddle Atlantic: New York. New Jersey Pennsylvania ast North Central:		1	37, 102	21, 113	19.2	13.
New Jersey			6, 826	3, 948	23. 0 21. 9	15.
Pennsylvania			44, 262	27, 394	21.9	15.
ast North Central:		1	PV 044	en 201	29. 5	90
Indiana			75, 644 65, 587	57, 604 54, 575	32.0	28. 30.
Illinois			101, 196	92, 482	42.7	43.
Ohio Indiana III I			101, 196 34, 722 27, 258	92, 482 20, 195 33, 121	32.0 42.7 17.7	15. 18.
Wisconsin			27, 258	33, 121	14.4	18.
Vest North Central:			44, 138	57, 638	24.7	21
Town			89, 064	101, 615	41.7	31. 47. 34.
Missouri			75, 727	89, 076	28.81	34.
Minnesota Iowa Missouri North Dakota South Dakota			89, 064 75, 727 19, 918 26, 041	97, 638 101, 615 89, 976 27, 400 37, 094 61, 020 70, 326	25.6	35.
South Dakota			26, 041 53, 430	81 099	34.9 42.9	44. 47.
1/ GDT 007-0			66, 701	70, 326	40.4	42
outh Atlantic:		1				
Kansas outh Atlantic: Delaware Maryland District of Columbia Virginia West Virginia North Carolina South Carolina Georgia Florida jast South Central: Kantucky	208	225	3, 986	3, 282	39.3	33.
Maryland	1,459	1, 646	13, 841 85	11, 441 24	28. 9 41. 7	26. 23.
Virginia	13, 715	17, 253	47, 745	47, 970	25.6	28.
West Virginia	1,628	1, 834	47, 745 14, 098	47, 970 15, 347	16.2	18.
North Carolina	1, 628 39, 939	69,091	117, 459	137, 615	43.5	49.
South Carolina	43, 789	48, 939	117, 459 124, 231 206, 954	104,768	64. 5 66. 6	65. 68
Tioride	43, 789 97, 497 4, 291	17, 253 1, 834 69, 091 48, 939 100, 854 4, 816	13, 689	137, 615 102, 768 174, 390 16, 737	25.3	28
ast South Central:	7,502			į.	1	
	29, 450 38, 078 47, 897	30, 250 50, 304 65, 134 135, 293	90, 330	88, 421	33.4	85
Tennessee	38,078	50, 304	103, 885 148, 269 179, 802	113, 520 166, 420 225, 617	41.1 57.9	46 64
Alabama Mississippi Vest South Central:	86, 859	135 293	179, 802	225 617	66.1	72
Vest South Central:	1			•	,	
	47, 665	75, 034	119, 221	152, 691	51.3 57.1	63
Louisiana Oklahoma	31,309	99, 428	119, 221 77, 381 97, 836	152, 691 107, 551 125, 329	51.0	61
Texas	47, 665 31, 309 8, 926 68, 381	49, 428 21, 055 105, 122	232, 309	301, 660	53. 3	60
formtuin:	)	1	1	1	1	
MontanaIdaho			6, 507 6, 701 1, 968	11, 628 10, 559	11.3 15.9	24 25
Unamina			1, 701	3, 520	12.5	22
Colorado			13, 743	20.602	28.0	34
Vyonnado New Mexico Arizona Utah			3, 655	6, 330 2, 331 3, 321	12.2	20
Arizona	.		1, 801 2, 787	2,331	18.1	111
Nevada			2, 737	3, 321	9.4	1 19
Ponifle:	1	ı	1	1	1	
Washington	.		12, 419	12,078	18.7	1
Oregon	-	.	9,427	9, 790	18.8	1 1
Washington Oregon. California		·	25, 141	24, 402 7, 885 52, 455 268, 977 444, 166	21.4	1
Aiddle Atlantic			88, 190	52, 455	7.4 20.7	1 2 8
East North Central			304, 407	268, 977	28.1	2
Vest North Central			11, 602 88, 190 804, 407 375, 019	444, 169	34.2	8
South Atlantic	202, 526	244, 658 280, 981	522 200	509, 574 503, 979		5
West South Central	156. 281	250, 639	528. 747	687. 231	52.9	1 6
Mountain			542, 088 522, 286 526, 747 37, 478 46, 957	593, 978 687, 231 58, 326	15.4	2
New England Middle Atlantic East North Central West North Central South Atlantic East South Central West South Central West South Central Pacific	-		46, 987	46, 270	20.1	1
United States			-		38. 1	4
United States	oui UJi	1 440. 218	1 4, 404, 504	ა გადიაგის	u ( 400-1	

Table 480.—Farm mortgage debt: Estimated total for all farms, by States, January 1, 1910-1930

New England		, , , , , , , , , , , , , , , , , , ,				
Maine	State and division	1910 1	1920	1925	1928	1930 2
Maine		1,000	1,000	1,000	1,000	1,000
Allegacinsteries		1 2017448	dollars	dollars	dollars	dollars
Allegoritists   2, 25	Maine	_ 13, 210	20, 890	26, 097	25, 252	24, 823
Allegardinestrix   2, 280   2, 281   3, 292   2, 283   3, 292   2, 283   3, 292   2, 283   3, 292   2, 283   3, 292   2, 283   3, 292   2, 283   3, 292   2, 283   3, 292   2, 283   3, 292   2, 283   3, 292   2, 283   3, 292   2, 283   3, 292   2, 283   3, 292   2, 283   3, 292   2, 283   3, 292	New Hampshire	- 5,870	8,600	7,732	7,780	9,901
New England	N Taccachy seat to	-1 20,800	29, 040	23, 001	20, 322	42 550
New England	Rhode Island	- 2,210	2, 350	2, 435	2, 455	3 854
New York	Connecticut	16,080	25, 800	27, 276	27, 423	30, 514
New Jersey	New England	76, 110	120, 860	123, 748	122, 494	144, 744
New Jersey		154, 190	224, 060	226, 776	219, 812	247, 633
Middle Atlantic	New Jersey	1 31 720	89, 500	41, 741	40, 370	56, 884
Ohio Indiana						174,037
Stindingsh			396, 640			
Stindingsh	Ohio	113, 320	210, 760	214, 409	222, 101	259,630
Stendard   109, 90   215, 740   222, 989   235, 399   226, 377   Wisconsin   198, 600   455, 470   504, 563   529, 962   502, 549   502, 542, 549   502, 542, 549   502, 542, 549   502, 542, 549   502, 542, 5	Illinois	266 780	502, 280	209, 488 850 282	685 285	891 286
Base   Base	Michigan	109, 970	215. 740	228, 089	235, 399	230, 377
Minnesota	Wisconsin	193, 600	455, 470	504, 553	529, 992	502, 549
Nobraska		794, 950	1, 591, 420	1,861,887		
Nobraska	Minnesota	146, 160	455, 540	553, 784	558, 458	530, 025
Nebrasia	10wu	431,500	1 1 008 070	1, 424, 352	1, 402, 178	1,098,610
Nebrasia	North Dabota	101 480	967 790	998 714	920, 950	428, 227
West North Central	South Dakota	88, 700	278, 880	372,004	870, 946	205, 725
West North Central	Nebraska	161, 850	416, 860	617, 930	599, 418	560, 978
Delaware	Kansas	183, 770	295, 870	482, 596	447, 586	487, 122
Starty Bild	West North Central	1, 296, 080	3, 199, 690	4, 126, 402	4, 056, 187	3, 605, 280
West Virginia   2, 200	Delaware	6, 500	8,990	8, 695	9, 469	11,841
West Virginia   2, 200	District of Columbia	29,580	49, 230	50, 422	54,980	64,825
South Atlantic   141,250   347,470   439,609   491,896   503,927	Virginia	24,000	61,600	70 700	87 117	99 98K
South Atlantic	West Virginia	8, 210	1 15 ORA	1 12 570	20, 155	24, 283
South Atlantic   141,250   347,470   439,609   491,896   503,927	North Carolina	18, 960	56, 580	78, 606	90, 866	104.979
South Atlantic	South Carolina	20, 530	51, 220	68, 735	77, 214	67, 507
South Atlantic   141, 250   347, 470   439, 609   491, 896   503, 927	COL \$19	20.000	19,710	25, 508	28, 436	100, 845 45, 140
East South Central         123, 560         320, 100         356, 378         381, 497         365, 609           Arkansas         22, 200         76, 870         97, 809         103, 464         85, 577           Louisiana         19, 090         41, 250         57, 910         61, 760         61, 379           Dialahoma         77, 680         138, 890         218, 963         228, 513         214, 033           Fenas         172, 240         396, 670         428, 587         507, 515         543, 951           West South Central         291, 210         703, 680         860, 269         901, 252         904, 940           Montana         19, 620         154, 940         116, 616         104, 862         129, 200           daho         24, 270         115, 350         107, 355         100, 033         106, 908           Wyoming         7, 820         32, 970         43, 364         40, 922         42, 948           Colorado         41, 800         138, 400         153, 727         144, 464         462           New Mexico         4, 810         23, 670         28, 784         26, 900         30, 729           Tiah         7, 170         35, 550         39, 152         36, 367	South Atlantic	141, 250			491, 896	
East South Central         123, 560         320, 100         356, 378         381, 497         365, 609           Arkansas         22, 200         76, 870         97, 809         103, 464         85, 577           Louisiana         19, 090         41, 250         57, 910         61, 760         61, 379           Dialahoma         77, 680         138, 890         218, 963         228, 513         214, 033           Fenas         172, 240         396, 670         428, 587         507, 515         543, 951           West South Central         291, 210         703, 680         860, 269         901, 252         904, 940           Montana         19, 620         154, 940         116, 616         104, 862         129, 200           daho         24, 270         115, 350         107, 355         100, 033         106, 908           Wyoming         7, 820         32, 970         43, 364         40, 922         42, 948           Colorado         41, 800         138, 400         153, 727         144, 464         462           New Mexico         4, 810         23, 670         28, 784         26, 900         30, 729           Tiah         7, 170         35, 550         39, 152         36, 367	Kentucky	40, 510	104, 100	94, 549	103, 798	97,668
East South Central         123, 560         320, 100         356, 378         381, 497         365, 609           Arkansas         22, 200         76, 870         97, 809         103, 464         85, 577           Louisiana         19, 090         41, 250         57, 910         61, 760         61, 379           Dialahoma         77, 680         138, 890         218, 963         228, 513         214, 033           Fenas         172, 240         396, 670         428, 587         507, 515         543, 951           West South Central         291, 210         703, 680         860, 269         901, 252         904, 940           Montana         19, 620         154, 940         116, 616         104, 862         129, 200           daho         24, 270         115, 350         107, 355         100, 033         106, 908           Wyoming         7, 820         32, 970         43, 364         40, 922         42, 948           Colorado         41, 800         138, 400         153, 727         144, 464         462           New Mexico         4, 810         23, 670         28, 784         26, 900         30, 729           Tiah         7, 170         35, 550         39, 152         36, 367	l'ennessee	26, 850	83, 130	85, 857	96, 711	87, 313
East South Central 123, 560 320, 100 356, 378 381, 497 365, 609 arkansas 22, 200 76, 870 97, 809 103, 464 85, 577 19, 090 41, 250 57, 910 61, 760 61, 379 20 102 103 104 104 105 105 105 105 105 105 105 105 105 105	Alabama	24, 880	55, 450	66, 410	69, 488	83, 764
Arkansas 22, 200 76, 870 97, 809 103, 484 88, 877 Louisiana 19, 090 41, 250 87, 910 61, 760 61, 379 Dklahoma 77, 680 188, 890 218, 963 228, 513 214, 033 Feas 172, 240 396, 670 485, 587 507, 515 543, 951  West South Central 291, 210 703, 680 860, 289 901, 252 904, 940  Montana 19, 620 154, 940 116, 616 104, 862 129, 200 daho 24, 270 115, 380 107, 355 100, 033 106, 908  Myoming 7, 820 32, 970 43, 364 40, 922 42, 948 New Mexico 41, 800 138, 400 153, 727 144, 464 416, 462, 862 New Mexico 44, 810 23, 670 28, 734 26, 900 30, 729  Urizona 4, 880 31, 790 29, 545 29, 006 28, 743 Nevada 8, 340 11, 880 15, 244 13, 997 14, 737  Mountain 113, 710 544, 550 533, 787 496, 551 546, 000  Vashington 45, 040 116, 740 121, 371 120, 523 131, 299 Pregon 34, 950 91, 900 105, 503 110, 875 116, 805 Pacific 202, 070 633, 290 669, 742 691, 909 798, 525			77, 420	109, 562	111, 500	96,864
Origina         77, 680         183,890         218,983         228,513         214,033           Feas         172,240         396,670         485,687         507,515         543,951           West South Central         291,210         703,680         860,289         901,252         904,940           Montana         19,620         154,940         116,616         104,862         129,200           daho         24,270         115,350         107,355         100,033         106,908           Wyoming         7,820         32,970         43,364         40,922         42,948           New Mexico         41,800         138,400         153,727         144,464         164,622           New Mexico         4,810         23,670         23,784         26,900         30,729           Teah         7,170         35,550         39,152         36,367         46,273           Nevada         3,340         11,880         15,244         13,997         14,737           Mountain         113,710         544,550         533,787         496,551         546,000           Vashington         45,040         116,740         121,371         120,523         131,299           Pregon		123, 560			381, 497	365, 609
Origina         77, 680         183,890         218,983         228,513         214,033           Feas         172,240         396,670         485,687         507,515         543,951           West South Central         291,210         703,680         860,289         901,252         904,940           Montana         19,620         154,940         116,616         104,862         129,200           daho         24,270         115,350         107,355         100,033         106,908           Wyoming         7,820         32,970         43,364         40,922         42,948           New Mexico         41,800         138,400         153,727         144,464         164,622           New Mexico         4,810         23,670         23,784         26,900         30,729           Teah         7,170         35,550         39,152         36,367         46,273           Nevada         3,340         11,880         15,244         13,997         14,737           Mountain         113,710         544,550         533,787         496,551         546,000           Vashington         45,040         116,740         121,371         120,523         131,299           Pregon	Arkansas		76, 870	97, 809	103, 464	85, 577
West South Central         291, 210         703, 680         860, 269         901, 252         904, 940           Montana         19, 620         154, 940         116, 616         104, 862         129, 200           daho.         24, 270         115, 280         107, 355         100, 033         106, 908           Yyoming.         7, 820         32, 970         43, 364         40, 922         42, 948           clorado         41, 800         138, 400         153, 727         144, 464         416, 462           lew Mexico         4, 810         22, 670         28, 784         28, 900         30, 729           trizona         4, 880         31, 790         29, 545         29, 006         28, 743           Tah         7, 170         35, 550         39, 152         36, 367         46, 273           Nevada         3, 340         11, 880         15, 244         13, 997         14, 737           Mountain         113, 710         544, 550         533, 787         496, 551         546, 000           Vashington         45, 040         116, 740         121, 371         120, 523         131, 299           regon         34, 950         91, 090         105, 503         110, 875         116, 8	Oklahoma	77 480	199 900	919 049	900 812	61,379
West South Central         291, 210         703, 680         860, 269         901, 252         904, 940           Montana         19, 620         154, 940         116, 616         104, 862         129, 200           daho.         24, 270         115, 280         107, 355         100, 033         106, 908           Yyoming.         7, 820         32, 970         43, 364         40, 922         42, 948           clorado         41, 800         138, 400         153, 727         144, 464         416, 462           lew Mexico         4, 810         22, 670         28, 784         28, 900         30, 729           trizona         4, 880         31, 790         29, 545         29, 006         28, 743           Tah         7, 170         35, 550         39, 152         36, 367         46, 273           Nevada         3, 340         11, 880         15, 244         13, 997         14, 737           Mountain         113, 710         544, 550         533, 787         496, 551         546, 000           Vashington         45, 040         116, 740         121, 371         120, 523         131, 299           regon         34, 950         91, 090         105, 503         110, 875         116, 8	Celas	172, 240	396, 670	485, 587	507, 515	543, 951
Value     45,80     31,790     22,542     25,900     30,729       Jtah     7,170     35,550     39,152     36,367     46,273       Nevada     3,340     11,880     15,244     13,997     14,737       Mountain     113,710     544,550     533,787     496,551     546,000       Vashington     45,040     116,740     121,371     120,523     131,299       Dregon     34,950     91,090     105,503     110,875     116,805       Jalifornis     122,080     425,460     442,868     460,511     548,421       Pacific     202,070     633,290     669,742     691,909     798,525	West South Central	291, 210	703, 680		901, 252	
1,000   25	Montana	19, 620	154, 940	116, 616	104, 862	129, 200
1,000   25	Uano	24, 270	115, 350	107, 355	100, 033	ากลอกฉ
1,000   25	Coloredo	7,820	32, 970	43, 364	40, 922	42, 948
Jtah         7, 170         35, 550         39, 152         36, 367         46, 273           Nevada         3, 340         11, 880         15, 244         13, 997         14, 737           Mountain         113, 710         544, 550         533, 787         496, 551         546, 000           Vashington         45, 040         116, 740         121, 371         120, 523         131, 299           Pregon         34, 950         91, 090         105, 503         110, 875         116, 805           Pacific         202, 070         633, 290         669, 742         691, 909         798, 525	New Mexico	4 810	23 670	20, 727	26 000	146, 462
Nevada.     3,340     11,880     35,242     33,387     46,273       Mountain.     113,710     544,550     533,787     496,551     546,000       Vashington.     45,040     116,740     121,371     120,523     131,299       Pregon.     34,950     91,090     105,503     110,875     116,805       Salifornia.     122,080     425,460     442,868     460,511     548,421       Pacific.     202,070     633,290     669,742     691,909     796,525	rizona	4,880	31, 790	29, 545	20, 300	99 749
Mountain         113,710         544,550         533,787         496,551         546,000           Vashington         45,040         116,740         121,371         120,523         131,299           regon         34,950         91,090         105,503         110,875         116,805           salifornis         122,080         428,460         442,888         460,511         548,421           Pacific         202,070         633,290         669,742         691,909         796,525	tah	7,170	35, 550	39, 152	36, 367	46, 273
Vashington         45,040         116,740         121,371         120,523         131,299           regon         34,950         91,090         105,503         110,875         116,805           salifornia         122,080         425,460         442,868         460,511         548,421           Pacific         202,070         633,290         669,742         691,909         796,525					13, 997	
Pacific 202, 070 633, 290 669, 742 691, 909 796, 525						546, 000
Pacific 202, 070 633, 290 669, 742 691, 909 796, 525	vasnington	45, 040	116, 740	121, 371	120, 523	131, 299
Pacific 202, 070 633, 290 669, 742 691, 909 796, 525	alifornia	122, 080	425, 460	442, 868	460, 511	548, 421
The latest Change of the Control of	1	202, 070				
	United States	3, 320, 470	7, 857, 700	9, 360, 620	9, 468, 526	9, 241, 390

Bureau of Agricultural Economics.

<sup>1</sup> Revised.

<sup>&</sup>lt;sup>2</sup> Preliminary.

Table 481.—Agricultural loans from selected Federal and other agencies, outstanding at close of year, 1917-1931

	F	'arm mortga	ge loans 1 by-	_		atermediate ank loans
End of year	Federal land banks <sup>2</sup>	Joint-stock land banks <sup>2</sup>	Loans of 40 life insur- ance com- panies <sup>3</sup>	Member banks 4	Coopera- tive associa- tions <sup>2</sup>	Financing agencies <sup>2</sup>
1917	Million dollars	Million dollars	Million dollars	Million dollars	Thousand dollars	Thousand dollars
1918	156 294 350 433	8 60 78 85 219				
1922 1923 1924	639 800 928	393 446	1, 335 1, 452 1, 523		83, 627 43, 507 53, 780	9, 105 18, 760 26, 272
1925	1,078 1,156 1,194	546 632 667 605	1, 588 1, 618	6 489 6 478 6 444	53, 780 52, 704 81, 991 36, 174	26, 272 39, 730 43, 924 45, 103
1929 1930 1931	1, 197 1, 187 1, 163	585 553 530	1, 606 1, 591 1, 554	388 387	26, 073 64, 377 45, 255	50, 018 65, 633 74, 613

Bureau of Agricultural Economics.

Table 482.—Selected interest and discount rates, and bond yields, 1917-1931

Year	12 Federal land banks' rates to borrow- ers 1	mediat banks' discour	loan and at rates 1	Yield on Federal land bank bonds	Rates on commer- cial paper (4-6 months) (aver-	rates (New
	CLS -	Loans	Discounts		age) <sup>3</sup>	York) 2
1917	5.50 5.50 5.88 5.71 5.50 5.50 5.46 5.30 5.11		5.50 5.33 5.04 4.90 4.73 4.91 5.61 4.54 4.03		Average 4. 74 5. 88 5. 42 6. 56 4. 48 5. 40 5. 40 5. 87 4. 03 4. 10 4. 85 5. 84 8. 58 2. 63	Range 4 -41 415-43 431-7 4 -41 3 -41 3 -41 3 35-4 315-4 315-4 115-3

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<sup>1</sup>See table for total mortgage debt, by States. 2Federal Farm Loan Board. Beginning 1928 loans from joint-stock land banks in receivership not

Federal Farm Loan Board. Beginning 1928 loans from joint-stock land banks in receivership not included.

Responsible to the American Presidents. Reports cover operations of 40 companies representing 82 per cent of the admitted assets of all legal reserve life companies in the United States

Federal Farm Loan Board.

Responsible to the United States

Federal Reserve Board.

June 30.

<sup>&</sup>lt;sup>1</sup> Federal Farm Loan Board.

<sup>&</sup>lt;sup>2</sup> Federal Reserve Board.

# MISCELLANEOUS AGRICULTURAL STATISTICS

<mark>අදුදරුදුම</mark> ෙසුදු සුටයු සුදු සුදුරු සුදු සුදු සුදු දුදු දුදු ද
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<b>网络山瓜山德尔托瓦内西西部岛西西西西西西西部西西西西西西西西西西西西西西西西西西西西西西西西西西</b>
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1 Normals are based on records of 30 or more years of observations. Weather Bureau.

TABLE 484.—Precipitation: Normal 1 and 1931, by months.

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Weather Bureau. T.=Trace, indicates an amount too small to measure. I Normals are based on records of 20 or more years of observations.

Table 485.—Frost: Dates of killing frosts, with length of growing season

Table 485.—Frost: Dates of killing frosts, with length of growing season									
			Ave	ages and e	xtremes fo	r 80 to 51 3			
Station	Date of last kill- ing frost in spring, 1931	Date of first kill- ing frost in fall, 1931	Spring Latest date of killing frost	Average date of last kill- ing frost	Fall i Earliest date of killing frost	Average date of first kill- ing frost	Length of growing season between average dates of killing frosts		
Greenville, Me. Portland, Me. Concord, N. H. Northfield, Vt. Boston, Mass Hartford, Conn. Albany, N. Y Buftalo, N. Y Canton, N. Y Syracuse, N. Y Atlantic City, N. J Trenton, N. J Erie, Pa. Harrisburg, Pa. Pittsburgh, Pa. Scranton, Pa. Cincinnati, Ohio. Cloveland, Ohio. Columbus, Ohio. Columbus, Ohio. Columbus, Ohio. Columbus, Ohio. Toledo, Ohio. Evansville, Ind. Fort Wayne, Ind. Ind. Indianapolis, Ind. Cairo, Ill. Springfield, Ill. Alpana, Mich. Detroit, Mich. Grand Haven, Mich. Gran	May 181 May 18	Oct. 79 Oct. 19 Oct. 19 Oct. 19 Oct. 19 Oct. 19 Nov. 6 Oct. 9 Nov. 7 Nov. 6 Nov. 13 Nov. 6 Nov. 6 Nov. 6 Nov. 6 Nov. 6 Nov. 6 Nov. 6 Nov. 10 Nov. 6 Nov. 10 Nov. 10 Nov. 10 Nov. 10 Nov. 10 Nov. 11 Nov	June 23 June 20 June 20 June 20 May 18 May 21 May 30 May 30 May 21 May 29 May 29 May 21 May 29 May 21 May 25 May 21 May 25 May 21 May 25 May 25 May 21 May 25 May 25 May 21 May 25 May 25 May 25 May 21 May 25 May 25 May 21 May 25 May 21 May 25 May 21 May 25 May 21 May 20 June 6 May 21 May 25 May 20 June 14 May 25 May 21 May 25 May 21 May 25 May 21 May 25 May 21 June 14 May 21 May 22 May 21 May	May 104 May 14 May 14 May 17 May 21 Apr. 12 Apr. 18 Apr. 10 Apr. 10 Apr. 11 Apr. 17 Apr. 18 Apr. 18 Apr. 18 Apr. 18 Apr. 18 Apr. 18 Apr. 19 Apr. 22 Apr. 18 Apr. 19 Apr. 24 Apr. 19 Apr. 25 Apr. 18 Apr. 19 Apr. 20 Apr. 30 Apr. 30 Apr. 30 Apr. 30 Apr. 30 Apr. 30 Apr. 30 Apr. 24 Apr. 44 Apr. 14 Apr. 12 Apr. 14 Apr. 14 Apr. 14 Apr. 14 Apr. 14 Apr. 15 Apr. 16 Apr. 17 Apr. 16 Apr. 17 Apr. 17 Apr. 17 Apr. 17 Apr. 17 Apr. 17 Apr. 17 Apr. 17 Apr. 17 Apr. 17 Apr. 17 Apr. 17 Apr. 17 Apr. 17 Apr. 18 Apr. 18 Apr. 18 Apr. 18 Apr. 18 Apr. 19 Apr. 20 Apr. 19 Apr. 21 Apr. 14 Apr. 17 Apr. 17 Apr. 17 Apr. 17 Apr. 17 Apr. 17 Apr. 17 Apr. 17 Apr. 18 Apr. 18 Apr. 18 Apr. 18 Apr. 18 Apr. 18 Apr. 18 Apr. 18 Apr. 19 Apr. 20 Apr. 19 Ap	Frost  Aug. 26 Sept. 21 Sept. 26 Sept. 26 Sept. 18 Sept. 19 Sept. 19 Sept. 19 Sept. 19 Sept. 19 Sept. 20 Sept. 19 Sept. 20 Sept.	Sept. 14   Oct. 18   Sept. 22   Sept. 10   Oct. 18   Sept. 10   Oct. 18   Sept. 22   Sept. 10   Oct. 12   Oct. 13   Oct. 14   Oct. 17   Oct. 16   Oct. 17   Oct. 17   Oct. 18   Oct. 19   Oct. 19   Oct. 19   Oct. 19   Oct. 10			

<sup>&</sup>lt;sup>1</sup> Temperature 32° F. or below.

Table 485.—Frost: Dates of killing frosts, with length of growing season—Continued

			Ave:	ages and e	xtremes fo	r 30 to 51 y	ears
	Date of last kill-	Date of first kill-	Spring	frosts	Fall i	rosts	Length of growing
Station	ing frost in spring,	ing frost in fall,	Latest date of killing frost	Average date of last kill- ing frost	Earliest date of killing frost	Average date of first kill- ing frost	season between average dates of killing frosts
Columbia, S. C. Greenville, S. C. Arlanta, Ga. Augusta, Ga. Macon, Ga. Savannab, Ga. Thomasville, Ga. Apalachicola, Fla. Avon Park, Fla. Jacksonville, Fla. Mami, Fla. Chattancoga, Tenn Knoville, Tenn Memphis, Tenn Nsshville, Tenn Sirmingham, Ala. Mohile, Ala. Mohile, Ala. Mohile, Ala. Mohile, Tenn Sirmingham, Ala. Mohile, Tenn Sirmingham, Ala. Mohile, Tex Shreveport, La. Abilene, Tex Amarillo, Tex El Paso, Tex El Paso, Tex El Paso, Tex Fort Worth, Tex Galveston, Tex San Antonio, Tex Taylor, Tax Oklahoma City, Okla Fort Smith, Ark Little Rock, Ark Havre, Mont Helena, Mont Kalispell, Mont Kalispell, Mont Kalispell, Mont Miles City, Mont Cheyenne, Wyo Danver, Colo Grand Junction, Colo Pusblo, Colo Pusblo, Colo Roswell, N. Mex Santa Fa, N. Mex Flagstaff, Ariz Pheenix, Ariz Tucson, Ariz Yuma, Ariz Modena, Utah Salt Lake City, Utah Reno, Nev Winnemucca, Nev Boise, Idaho Lewiston, Idaho Pocatello, Idaho Pocatello, Idaho Sesttle, Wash Spokana, Wash Baker, Oreg Rossburg, Oreg Eureka, Calif Enceno, Calif San Diego, Calif San Prancisco, Calif. San Prancisco, Calif.	1931	1931		Mar. 18 Apr. 3 Mar. 3 Mar. 32 Mar. 14 Feb. 26 Mar. 14 Jan. 12 Feb. 16 Jan. 26 Apr. 2 Apr. 2 Mar. 17 Mar. 10 Jan. 26 Apr. 17 Mar. 10 Jan. 28 Mar. 14 Jan. 11 Jan. 12 Feb. 17 Mar. 10 Jan. 28 Jan. 21 Mar. 11 Jan. 21 Mar. 14 Mar. 13 Mar. 14 Mar. 11 Jan. 28 Mar. 14 Jan. 21 Feb. 23 Mar. 14 Mar. 11 Jan. 21 Feb. 23 Mar. 14 Mar. 11 Jan. 21 Feb. 24 Mar. 11 Jan. 21 Feb. 24 Mar. 11 Jan. 21 Feb. 24 Mar. 11 Jan. 21 Feb. 24 Mar. 11 Jan. 28 Mar. 14 Mar. 11 Jan. 28 Mar. 14 Mar. 11 Jan. 20 May 19 May 20 May 21 May 31 Feb. 16 May 31 Feb. 16 May 31 Feb. 16 May 31 Feb. 16 Mar. 22 May 31	killing frost  Oct. 30 Oct. 10 Oct. 11 Oct. 21 Nov. 12 Sept. 30 Oct. 31 Nov. 12 Sept. 30 Oct. 31 Oct. 21 Oct. 31 Oct. 31 Oct. 31 Oct. 31 Oct. 31 Oct. 31 Oct. 31 Oct. 31 Oct. 31 Oct. 31 Oct. 32 Oct. 31 Oct. 32 Oct. 31 Oct. 32 Oct. 31 Oct. 32 Oct.	data off- first kill- ing frost  Nov. 18  Nov. 22  Nov. 27  Nov. 10  Nov. 20  Nov. 20  Oct. 26  Oct. 26  Oct. 28  Oct. 29  Oct. 29  Oct. 29  Nov. 10  Oct. 29  Oct. 20  Oct. 2	dates of killing frosts    245   245   223   221   225   226
Reno, Nev	Apr. 25 May 19 Apr. 26 Apr. 30 May 8 Mar. 5 Apr. 3 Mar. 28 May 21 Feb. 22 Mar. 26 None Jan. 19 Jan. 19 Jan. 19 Jan. 19 Mar. 2	Sept. 23 Sept. 24 Nov. 29 Nov. 12 Oct. 8 Nov. 12 Sept. 23 Nov. 21 Nov. 21 Nov. 22 1 Nov. 22 1 Nov. 23 1 Nov. 23 1 Nov. 23	June 13 June 22 June 16 May 10 June 1 May 10 June 2 June 2 May 2 May 2 May 24 Apr. 14 May 9 May 2 May 2 Apr. 14 June 13 May 9 May 2 May 2 May 2 May 2 May 2 May 2 May 2 May 2 May 2 May 3	Mar. 15 Apr. 14 Feb. 8 Feb. 22 Apr. 6 (2) Mar. 10 Feb. 19 Mar. 10 Mar. 10	Sept. 6 Aug. 22 Sept. 11 Sept. 21 Sept. 7 Sept. 24 Aug. 8 Oct. 12 Sept. 24 Nov. 13 Sept. 24 Sept.  Oct. 38 Sept. 26 Oct. 12 Oct. 25 Oct. 26 Nov. 21 Nov. 8 Nov. 11 Nov. 8 Nov. 11 Nov. 22 Oct. 26 Nov. 12 Nov. 22 Nov. 22 Nov. 22 Nov. 22 Nov. 22 Nov. 22	143 143 188 200 115 244 214 244 211 246 215 22 28 3 20 27 27 28 27 28 27 28 28 29 20 20 21 21 21 21 21 21 21 21 21 21 21 21 21	

Weather Bureau.

<sup>&</sup>lt;sup>1</sup> Temperature 32° F. or below.

<sup>2</sup> Frosts do not occur every year.

# Table 486.—Annual rainfall by States, 1881-1980 YEARS 1881-1890

Alabama Arizona Arizona Arizona Arizona Jalifornia Jolorado Florida Jeorgia Jeorgia Jeorgia Jeorgia Jeorgia Jeorgia Jeorgia	11. 68 42. 32 21. 46 22. 61 55. 76 52 88 17. 44 43. 71	60. 95 11. 75 72. 97 20. 22 15. 21 56. 57 53. 45 16. 15 47. 98	49. 74 11. 49 59. 41 16. 60 16. 43 45. 17 47. 21	52.58 16.66 62.05 36.61 14.66 52.41	53. 07 7. 12 37. 55 19. 52 16. 84	55. 33 12. 93 42. 96 19. 63 17. 38	47. 55 12. 20 41. 89 14. 63 15. 22	57. 42 12. 95 48. 94 18. 51 12. 00	43.30 13.59 45.78 30.89	49. 99 16. 80 65. 33 22. 49
Arizona Arkansas Jalifornia Jolorado Florida Jeorgia daho Illinois Indiana	11. 68 42. 32 21. 46 22. 61 55. 76 52 88 17. 44 43. 71	72. 97 20. 22 15. 21 56. 57 53. 45 16. 15	59.41 16.60 16.43 45.17 47.21	62.05 36.61 14.66 52.41	37. 55 19. 52 16. 84	42. 96 19. 63 17. 38	41.89 14.63	48. 94 18. 51	45. 78 30. 89	65. 33
Arkansas _alifornia _a	42. 32 21. 46 22. 61 55. 76 52 88 17. 44 43. 71	20. 22 15. 21 56. 57 53. 45 16. 15	16.60 16.43 45.17 47.21	36.61 14.66 52.41	19.52 16.84	19. 63 17. 38	14.63	18. 51	30.89	
Jalifornia Jolorado Florida Florida Florida Florida Jeorgia daho Illinois ndiana	21. 46 22. 61 55. 76 52 88 17. 44 43. 71	15. 21 56. 57 53. 45 16. 15	16.43 45.17 47.21	14.66 52.41	16.84	17. 38				. 65 YU
Calorado Florida Georgia dano Illinois ndiana	22. 61 55. 76 52 88 17. 44 43. 71	56. 57 53. 45 16. 15	45.17 47.21	52.41			15, 22	19 00 1		
Florida Jeorgia daho Ilinois ndlana	55. 76 52 88 17. 44 43. 71	53.45 16.15	47, 21						13.73	11.97
danolinoisndiana	43.71	16. 15			63.48	57. 07	51.04	54.42	50. 21	51.65
danolinoisndiana	43.71			49.82	58.50	48.08	49.48	58.07	53. 90	49.78
ndiana	. 1 43. 71	47 00	17.88	19.87	16.64	14. 27	16. 21	10.08	12.05	17.96
ndiana	44.98	4/. YX	47. 24	43.09	39.41	34.48	32, 38	37. 80	35. 55	38. 65
OWA		51. 72	51.78	42 42	38.47	39.79	36. 12	39.79	36, 02	49, 58
	44 18	33, 40	31.54	35.59	32, 23	24.70	26, 31	31.44	24.95	29, 48
Kansas	22 18	25, 35	31.71	32.39	32.03	25. 11	23.37	23, 43	29, 44	21, 16
Kentucky	41 56	61. 97	55.48	50. 18	40.08	43.54	43, 25	44.98	35 97	58, 82
Louisiana	80.20	61.70	58.90	66 26	57.39	51, 36	51. 41	55, 10	40, 25	55. 43
Louisiana	41 69	42. 26	42.24	42.84	39 91	49. 20	37.68	44.92	59. 77	45.62
Maryland Michigan	41.00	38. 69	39. 68	36. 58	35.00	31.96	29.81	28, 68	26.86	34. 23
VI IGHI IGHI	90.04	28. 35	26.11	29.48	23, 18	26. 02	23. 70	25. 10	19.08	25.01
Minnesota Mississippl	60.02	66.99	55.75	64. 01	48. 59	49.60	44. 57	(50, 00)	38. 31	56. 23
Mississippi	-(00 00)		41.63	40.45	39.94	38. 91	32. 77	41. 22	37. 91	35.71
Missouri	39.28	39.96	13.50	17.87	14. 15	11.98	15. 98	15.03	9. 24	10, 78
Montana	- 16.00	12.54	30.74		25.98	23. 71	22, 99	22.86	22. 64	17. 18
Nebraska	- 30.91	23. 51		24.00		10.88	5. 18	5.76	10. 17	
NevadaNew JerseyNew MexicoNew York	7.21	10.39	9.77	13.66	7.81		5. 15			12.88
New Jersey	44.10	54.75	43.80	46.63	87.87	46. 54	47.66	52. 20	63. 33	49. 34
New Mexico	22.57	12 57	11.30	15. 23	12.43	16. 56	13.48	17.97	10. 74	13 10
New York	35.44	35.48	35.33	35. 23	37.89	37.47	36. 28	43.88	47. 57	49.60
North Carolina North Dakota	_ 50.81	59.73	58. 23	54.42	53.73	53.06	52.09	54.98	50. 76	46.49
North Dakota	_ 18.73	21.12	16.76	20.91	17.50	16.49	19. 57	16 40	11. 30	17. 12
OhioOklahoma	_ 52.53	45.03	44.93	36. 19	38.06	36.71	33, 63	39.64	33.41	50.33
Oklahoma	_(30 00)	(50.00)	(35.00)	38. 39	36.36	(25.00)	27. 29	23.40	30. 24	38.42
Oregon	34 48	30.40	22.68	28 84	25. 57	24.70	80.05	23.32	21. 80	22, 24
Pennsylvania	39.29	45.45	43.57	45. 94	40.98	42.63	43 10	45.91	52. 67	51, 28
South Carolina	(50, 00)	(52, 00)	43 54	49.94	52.04	46.27	(50.00)	54.63	46. 76	42, 29
Oregon Pennsylvania South Carolina South Dakota	23.62	20.56	24.90	19.93	22.00	22, 12	23. 48	17.61	19.85	16.43
Tennessee	50.35	65.77	56, 32	55, 57	44. 36	51.75	44. 97	48, 29	45, 50	57, 60
Texas	32, 23	30.76	28.78	34. 53	29, 95	26, 25	29. 71	38, 40	34, 80	31.37
		9.67	7.72	15. 15	13.00	13. 48	6, 55	13, 62	10.41	9.00
Virginia	85.40	45.88	41. 24	40.54	38, 56	54.09	45, 38	47.44	59. 59	41.62
Washington	42.17	35. 28	28.01	35.74	38. 99	38. 55	46. 71	47, 90	27. 91	33, 66
West Virginia	49.10	(60, 00)	61.53	48.85	37. 23	39.80	85. 33	50. 84	42. 19	57. 53
Wisconsin	48.38	37. 15	35. 38	40.88	34, 48	83.74	32. 66	31. 02	27. 04	37. 04
Wroming	11 88	(12.00)	19.24	15.54	16, 12	7.16	8.80	15. 22	10.81	12. 76
Utan Virginia Washington West Virginia Wisconsin Wysconsin Wyoming New England	46.01	41.98	38.58	48.14	43.11	45.73	47. 21	53. 49	47. 87	49. 39
Mean (United States)	27 KK	38, 42	35, 99	38. 51	34.67	34.78	33. 67	37. 03	34, 50	37. 19

# YEARS 1891-1900

State	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900
Alabama Arizona Arkansas	52. 85	56.81	50.11	47. 42	49.92	45. 25	47. 30	49. 09	47.84	66, 16
Arizona	9. 64	10.11	11. 17	10.65	11.08	13, 39	12.87	12. 61	8.41	8. 30
Arkansas	44. 49	57.75	47.91	49.95	44.69	38. 02	46. 52	56. 83	41, 49	49. 03
California Colorado Florida	20. 22	23.60	21.28	25, 78	14.85	30. 91	18. 44	10. 35	22, 47	19.84
Colorado	19.88	15.56	12.86	14.37	18. 33	15. 07	19.46	14. 61	14. 67	14.43
Florida	48, 14	47.99	53.01	52. 51	45. 50	49. 62	58. 69	48. 36	53. 93	61, 19
Florida. Georgia Idaho Illinois Indiana Iowa. Kansas Kentucky Louisiana Maryland and Delaware. Michigan Mississioni	49.63	51.12	40. 29	49.75	49. 57	45. 15	49. 23	53. 14	44. 20	57. 33
Idaho	16, 29	17.51	19.98	20.64	13. 26	21, 24	19. 72	14. 22	17.87	16. 12
Illinois	34.01	41.37	34.09	28, 89	31.89	36. 59	35. 85	46. 64	33. 02	35. 38
Indiana	40.05	41.83	41. 54	32. 21	30.99	40.62	40.44	45, 71	34. 97	37. 83
Iowa	32.90	36.58	27, 59	21.94	26.77	37, 23	26.98	31.34	28.68	35. 05
Kansas	31. 14	29.02	20. 25	20. 72	28.08	28, 72	24, 45	31. 79	26, 26	27. 96
Kentucky	49.69	44.25	44.71	34. 81	38, 47	44.68	46. 72	52, 38	46. 38	44. 40
Louisiana	51. 55	61.67	50.18	50.94	54.56	46, 36	51.60	63, 60	42 29	65.40
Maryland and Delaware	50. 20	39.39	38.76	38, 24	34.47	37. 11	44, 97	42, 11	40.84	36.66
Michigan	30 65	33, 69	84.55	28.00	26, 90	31.74	31, 23	32, 29	28. 35	32.31
Minnesota	24. 52	28.38	24, 45	21. 63	22, 68	31.02	27, 23	24, 21	30. 14	29. 79
Mississippi Missouri Montana	58. 24	57.47	51.54	47.60	47. 69	43, 13	46.62	54. 58	44. 52	66.54
Missouri	38.04	42.76	38, 19	33, 18	39. 30	44. 63	38, 82	53. 67	37. 32	38. 34
Montana	18.03	14.82	13, 88	15, 28	12, 97	17. 50	15.71	16.82	15. 28	13. 34
		24.12	16.80	13. 30	18, 70	26, 17	23, 54	20. 70	19. 51	24, 46
Nevada. New Jersey New Mexico. New York. North Carolina. North Dakots.	14.08	10.54	9, 22	10.89	7.90	10.61	9. 79	6. 49	9.12	8. 25
New Jersey	47, 98	42.04	47. 90	47. 37	37. 29	42.51	51.72	52.35	45.84	42.71
New Mexico	14.84	9.51	12.40	10.47	15. 36	13, 23	16. 52	14.03	10.98	13. 52
New York	38, 13	43, 77	42, 34	38, 73	83. 35	89. 13	40.30	43. 56	34.18	38. 03
North Carolina	54. 55	47.04	52.66	46. 57	50. 23	47. 54	46.06	50.04	52.08	48.40
North Dakota	22, 25	18.34	15. 91	15. 64	17. 32	23. 57	15. 88	15.17	17.67	18.96
Ohio Oklahoma	88.61	37.16	30, 63	29, 75	28. 46	39. 58	38. 50	43. 78	34.32	82.82
Oklahoma	22, 31	92 70	25, 49	25, 57	35, 08	23. 78	80 61	36. 44	36.99	32.50
Oregon	29, 16	27.87	29. 57	32, 52	25.17	83. 13	28.60	21. 02	31.06	24.57
Pennsylvania	45, 65	41.30	44. 26	43. 69	33. 51	41. 95	42.73	45. 49	40.93	37.31
South Carolina	(50, 00)	47.36	53, 68	50.49	48. 99	44. 95	48.40	49, 26	46.76	49.79
South Dakota	20. 05	24.41	17. 93	15. 30	16. 05	24. 14	21.09	16. 50		
Oregon Pennsylvania South Carolina South Dakota Tennessee	52.80	54. 17	45, 56	42.85	43 10	47 00	50 89	50.00	20.16	23.05

# Table 486.—Annual rainfall by States, 1881-1980—Continued YEARS 1891-1900—Continued

State	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900
Texas Utah Virginia Washington West Virginia Wisconsin Wyoming New England	30. 45 14. 36 48. 74 43. 32 45. 96 26. 14 14. 90 44. 38	29. 40 9. 50 40. 01 32. 97 38. 33 34. 95 15. 44 38. 96	20. 47 11. 56 46. 83 41. 23 39. 82 29. 80 9. 86 43. 11	27. 65 11. 43 35. 97 43. 42 34. 52 27. 14 12. 14 85. 79	32. 92 10. 66 38. 09 35. 56 32. 82 23. 14 17. 71 40. 79	27. 41 12. 20 42. 89 46. 20 43. 49 31. 21 15. 27 35. 98	27. 32 14. 55 40. 81 39. 82 41. 59 27. 75 13. 24 33. 11	28. 43 10. 61 44. 80 33. 04 47. 61 28. 07 13. 07 50. 78	28. 70 12. 10 43. 18 42. 39 40. 97 29. 83 13. 58 37. 76	42. 17 8. 38 39. 33 37. 56 37. 62 84. 65 10. 95 44. 92
Mean (United States)	35. 90	34.94	33. 74	31. 31	31.61	33.77	33. 33	36.78	32.81	35. 73

# YEARS 1901-1910

State	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910
Alabama		49. 27	49. 96	39. 21	55.03	55. 93	54.98	48. 01	58.32	45. 20
Arizona	10.61	10.32	9. 87	9.84	26.60	15.90	14.66	15. 55	12.60	8.99
Arkansas	35. 28	51.70	44. 62	43. 45	63.65	56.97	49.71	48.88	44.05	45. 21
California	22.12	24. 22	20.69	30. 39	21.59	38.70	32.49	18.78	42.13	16.77
Colorado	14.14	13.88	13.80	16. 30	18.09	19.71	16.33	17.09	20.96	14, 35
Florida	58. 47	51. 24	55. 79	48. 15	61.43	53.76	49.15	48. 54	49.52	50.88
GeorgiaIdaho	57. 58	49.99	53. 84	37. 17	51.03	54.60	48.73	50.03	48.31	43.60
Idaho	15.40	16.51	16.60	14.70	15.68	20.69	20.47	16.46	22.18	17.08
Illinois Indiana	25. 72	41.88	34. 94	37. 59	36.71	37. 26	40.65	35. 34	43.11	32.09
Indiana	30. 56	40.06	36. 73	38. 22	43.18	39.62	44.83	34.30	48.32	37.53
Iowa	24.41	43.82	35. 39	28. 51	36.56	31.60	31.61	35, 09	40.01	19.87
Kansas	21.35	34.42	31. 35	31.01	30.77	28.58	26.46	32, 30	81.15	19.67
Kentucky	85.65	44. 35	41. 16	35. 10	47.68	48.84	47.78	41.94	51.36	50.67
Louisiana Maryland and Delaware Michigan Minnesota	50. 60	46.32	49. 92	44. 18	76.57	48.42	60.00	58. 89	56.02	49.08
Maryland and Delaware	45.08	49. 20	46. 94	36. 49	43.84	48.01	48.86	40.01	37.47	37.42
Michigan	28.06	32. 53	32. 72	29. 73	33.32	31.41	30. 67	29.64	32.43	25.69
Minnesota	24. 26	29.46	32.85	29.65	33.10	31.66	24.03	29.49	29. 27	14.73
Mississippi	50. 16	48.07	46. 59	41.48	65.43	54.35	54. 12	54.76	57.97	47. 12
Missouri	25. 28	44.96	40.15	41.62	45.43	87.34	41.81	42.56	45. 16	36.86
Montana	15.08	15. 26	15. 03	11.04	14.38	18.47 26.98	17.00	20.09	19.57	15.99
Mississippi	22.76	29.09	27. 27	23. 37	31.65	15.87	20. 52 13. 06	26. 94 6. 34	25.55 11.03	17. 18 5. 53
New Jersey	13. 10	7.25	7.06	10.62	8.32 42.06	46.38	51.65	42.58	40.86	39.73
New Jersey	91.80	59.44	56. 25	43.78 14.41	20.95	15.89	16.13	12.68	12.83	9.46
New Mexico	14.00	9.97 42.95	11. 25 43. 27	38.63	39.02	37.48	38. 45	33.10	36.03	37. 26
New York	43. 30	44.46	50. 13	43, 27	51.94	59.53	48.64	57.79	47.78	48.42
North Carolina	02.00	19.34	19. 25	19.02	19.96	19.72	14.41	18. 64	17. 73	12.19
North DakotaOhio	19.48	37.58	36. 85	36. 19	39.08	36.88	42.85	34. 10	42.68	36.03
Ollahama	92. 00	40.54	29.41	29. 88	39.76	36, 93	33.71	50.54	26. 86	19. 24
OKIRIOIIII	24. 75	29.88	24. 96	32.46	21.05	29.50	31.71	20.90	32.85	26, 96
Demonis	E4 E4	47. 29	46. 27	40.44	43.34	42.78	45.45	39. 58	37. 38	38.99
South Carolina	NA 00	46.43	50.87	40.98	45.10	54.81	47. 79	53, 33	44.61	45.31
Oklahoma Oregon Pennsylvania South Carolina South Dakota	22 78	19.92	22.92	18.46	26.68	27.95	18.92	25. 10	23.69	15.49
Tennessee	AR OR	49.42	47. 23	40.74	50.85	53.86	49. 14	45, 59	50.63	45, 17
Texas.	20.00	33.92	33. 03	30.02	41.73	31.51	83, 86	32.91	23. 45	21.46
Utah	10 05	9.17	10. 21	11.43	13.58	18.34	16.07	14. 82	19.31	11.25
Virginia	50 17	51.42	44.85	36. 18	43.58	49.56	44. 19	45, 21	39, 81	41.37
Weshington	85 30	42.13	32.92	31. 57	81.63	35.71	32.02	32, 23	35. 77	33, 26
Washington West Virginia	44. 78	42.19	40.55	83. 33	45.53	44.36	52.15	40.47	43.02	38,60
Wisconsin Wyoming New England	26. 15	22.91	35 93	31 91	35.51	35 41	31.02	29.42	31.97	21.41
Wyoming	12.14	9.81	12.87	14. 29	16.03	17.82	14.63	17. 28	16.33	12.12
New England	47.79	45.95	42.08	39. 90	37.34	41.54	41.82	35.48	39.84	35.13
					-	<u> </u>		<u>'</u>		-
Mean (United States)	34. 24	36.30	34.97	31.97	37.24	37.39	36.17	34. 24	35. 92	30.11
		,	•				·	1		

### YEARS 1911-1920

State	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920
Alabama Arizona Arkansas California Colorado Fiorida Georgia Idaho Illinois Indiana Iowa Kansas Kentucky	52. 54 15. 35 44. 53 29. 39 19. 24 47. 40 48. 23 17. 68 38. 95 39. 85 31. 37 24. 53 46. 77	66. 45 12. 64 45. 83 222. 27 18. 84 64. 88 63. 02 21. 62 35. 55 40. 69 28. 65 26. 69 47. 93	52. 06 12. 02 54. 01 25. 20 17. 78 48. 02 46. 47 19. 88 85. 40 44. 20 29. 95 23. 02 47. 46	44. 90 16. 86 42. 85 31. 13 19. 26 49. 08 45. 58 16. 20 28. 99 31. 54 31. 93 23. 08 41. 80	53.75 15.50 53.08 33.82 19.49 56.30 49.63 19.09 41.77 39.53 40.77 51.92	53. 21 17. 06 42. 18 34. 84 18. 72 47. 10 43. 50 20. 63 37. 17 40. 69 28. 90 23. 84 45. 49	53. 74 12. 83 40. 72 16. 48 14. 72 41. 36 47. 41 20. 29 32. 54 36. 82 27. 81 19. 60 46. 01	56. 22 14. 74 44. 64 24. 47 19. 12 50. 09 48. 73 15. 98 37. 94 40. 83 32. 76 40. 64	65. 14 19. 19 54. 52 21. 29 17. 26 57. 35 54. 91 16. 44 37. 56 89. 01 36. 70 25. 65 52. 13	64. 20 13. 25 54. 28 26. 71 18. 18. 57. 79 59. 73 17. 77 32. 80 36. 97 31. 75 26. 65 46. 90
Louisiana Maryland and Delaware Michigan Minnesota	61.98	64.81 43.42 32.34 22.45	64. 65 38. 98 29. 79 25. 49	53, 37 35, 97 30, 02 28, 46	53 26 43.58 30.75 28.42	51. 07 40. 47 33. 97 28. 27	40. 22 40. 65 27. 21 20. 99	54. 46 37. 96 29. 47 24. 98	68. 97 47. 62 30. 23 27. 56	63. 12 44. 95 29. 10 25. 25

TABLE 486.—Annual rainfall by States, 1881-1930—Continued YEARS 1911-1920—Continued

State	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920
Mississippi Missouri Montana Nebrnska Nevada New Jersey New Mexico New York North Carolina North Dakota Ohio Okiahoma Oregon Pennsylvania South Carolina South Dakota Tennessee Texas Utah Virginia Washington West Virginia Wissonsin Wyoming New England	7. 84 50. 36 17. 92 36. 61 42. 65 19. 40 42. 63 28. 93 22. 76 45. 52 39. 80 19. 18 53. 11 29. 13 13. 02 41. 50 25. 97 47. 13 37. 00 13. 98 38 15	84. 15 43. 78 32. 51 18. 40 42. 15	57. 29 37. 47 15. 28 21. 97 10. 99 46. 99 15. 36 52. 37 17. 89 44. 75 33. 07 17. 89 47. 47 47. 42 49. 02 49. 02 39. 65 30. 42 47. 57 36. 05 12. 88 44. 75 30. 42 49. 02 32. 81 39. 77	46. 59 34. 72 15. 06 20. 78 39. 23 19. 24 19. 16 35. 41 25. 72 26. 40 38. 24 43. 39 21. 57 38. 24 37. 17 32. 19 32. 72 12. 69 34. 78	53. 94 49. 62 18. 71 35. 60 7. 97 47. 37 40. 91 50. 09 19. 42 40. 83 44. 26 44. 26 44. 26 44. 26 44. 26 44. 26 44. 26 44. 26 44. 26 45. 11 33. 37 28. 43 44. 43 45. 43 46. 43 47. 43 48. 43 48. 43 48. 43 48. 43 48. 43 49. 43 49. 43 49. 43 49. 43 49. 43 49. 43 49. 43 49. 43 49. 43 49. 43 49. 43 49. 43 49. 43 49. 43 49. 43 49. 44 40. 43 40. 44 40. 43 40. 44 40. 43 40. 43 40. 43 40. 43 40. 44 40. 43 40. 43 40. 44 40. 43 40. 43 40. 43 40. 44 40. 43 40. 43 40. 44 40. 43 40. 44 40.	51. 49 40. 33 18. 72 19. 08 9. 76 38. 19. 15. 95 38. 03 50. 91 50. 50 37. 24 40. 98 44. 91 20. 90 24. 59 15. 93 38. 33 38. 33 38. 33 38. 79 12. 79	45. 16 31. 04 14. 44 20. 80 6. 72 40. 80 38. 73 49. 85 10. 92 38. 51 10. 92 38. 51 10. 92 38. 51 11. 88 33. 80 34. 33 41. 11. 88 33. 80 34. 33 27. 28 13. 75 38. 93	40. 73 37. 16 13. 78 22. 36 9. 28 37. 65 15. 08 38. 23 50. 98 16. 02 38. 54 33. 55 20. 61 41. 25 44. 43 30. 12 44. 43 30. 12 44. 47 30. 12 38. 76	69. 24 40. 05 11: 14 25. 48 7. 08 52. 195 39. 69 48. 80 15. 76 40. 33 26. 21 46. 66 46. 79 20. 06 46. 79 20. 06 46. 79 20. 11: 83 47. 06 48. 00 48. 0	62. 85 37. 17 14. 50 24. 92 8. 89 51. 87 14. 87 40. 57 56. 34 37. 49 36. 35 36. 35 36. 35 36. 35 36. 35 36. 34 40. 63 36. 34 27. 44 41. 62 32. 64 41. 62 32. 64 41. 62 32. 64 41. 62 32. 64 41. 62 33. 64 43. 64 43. 64 44. 64 45. 64 46. 66 46. r>46. 66 46 46. 66 46 46. 66 46 46. 66 46 46 46 46 46 46 46 46 46 46 46 46 4
Mean (United States)	34. 70	36.30	35. 01	a4.08	01.42	04, 20	D1. 20	99, 00	81.80	37. 49

# YEARS 1921-1930

I FWW2 1451-1490											
State	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	Mean
Alabama Arizona Arkansas California Colorado Florida Georgia L'aho Illinois	47. 46 25. 89 19. 38 45. 24 40. 94 18. 34 40. 74	58. 78 12. 76 46. 50 28. 96 15. 60 57. 53 55. 38 15. 45 34. 15 38. 76	60. 87 16. 95 59. 85 14. 13 21. 23 50. 17 52. 76 18. 07 37. 99 42. 86	47. 23 8. 68 37. 03 17. 05 13. 75 61. 62 54. 27 12. 46 85. 81 37. 73	45. 20 12. 77 42. 19 21. 13 16. 96 52. 64 41. 00 18. 86 32. 83 84. 59	60. 79 16. 48 40. 24 27. 06 16. 98 59. 58 50. 44 16. 37 42. 94 43. 73	45. 48 15. 68 65. 85 27. 50 20. 32 40. 71 40. 65 22. 88 49. 38 49. 19	55. 51 9. 67 50. 50 18. 64 17. 05 60. 12 59. 92 13. 60 37. 40 36. 76	76. 48 11. 14 46. 10 15. 00 18. 16 59. 04 69. 83 13. 06 41. 94 47. 04	46. 17 15. 21 46. 62 18. 38 17. 33 60. 24 46. 13 16. 35 27. 89 29. 70	53, 11 13, 06 49, 03 23, 52 16, 79 52, 94 50, 48 17, 24 37, 26 40, 17
Iowa Kansas Kentucky Louisiana Maryland and Dela-	82. 03 24. 19 49. 42	29. 98 29. 01 44. 43 66. 44	29.50 31.88 53.92 71.21	31. 39 24. 23 42. 68 38. 47	28. 24 25. 08 41. 11 52. 48	33. 07 24. 80 49. 95 65. 98	29. 35 32. 40 53. 43 59. 51	35. 96 33. 40 45. 61 56. 06	30. 20 27. 96 48. 46 63. 65	26. 10 26. 87 27. 86 53. 01	81. 48 27. 48 45. 81 55. 74
ware Michigan Minnesota. Mississippi Missouri Montana. Nebraska Nevada. New Jersey New Mexico New York North Carolina. North Dakota.	87.72 81.84 23.00 48.25 43.77 14.64 21.30 8.30 88.16 16.46 85.41 42.92	40. 15 32. 10 22. 95 59. 43 39. 49 15. 12 20. 41 9. 55 41. 57 10. 86 39. 53 56. 88 19. 75 33. 89 23. 85	40. 27 28. 80 19. 81 71. 03 41. 23 18. 12 28. 02 40. 38 40. 38 45. 11 17. 76 24. 98 23. 37	46. 26 29. 79 24. 77 40. 06 40. 01 13. 71 21. 06 5. 49 44. 17 10. 65 58. 98 54. 57 17. 53 27. 86 21. 76	34. 91 25. 51 23. 93 49. 24 39. 78 16. 34 20. 89 10. 16 42. 15 13. 86 41. 41 37. 33 16. 81 34. 11 28. 31 23. 71	43. 90 33. 03 24. 63 56. 18 43. 07 13. 79 21. 07 6. 39 44. 41 17. 44 40. 19 43. 33 15. 70 43. 69 39. 04 25. 49	40. 37 31. 52 21. 44 55. 29 53. 56 20. 63 23. 50 7. 84 49. 68 13. 94 44. 95 21. 52 43. 01 39. 55 31. 12	45. 09 33. 33 25. 56 51. 27 45. 59 13. 06 22. 31 4. 87 46. 22 15. 09 39. 03 56. 21 18. 40 34. 89 36. 48 22. 42	42. 46 31. 22 20. 56 60. 03 46. 61 13. 08 23. 09 5. 83 42. 96 16. 48 43. 02 62. 09 14. 32 45. 83 19. 93	23, 78 22, 62 22, 59 47, 32 31, 27 35, 28 14, 64 14, 90 27, 00 19, 22	41. 89 31. 29 25. 91 53. 32 40. 09 15. 21 23. 51 9. 01 45. 89 14. 49 39. 02 50. 44 17. 68 38. 44 32. 24 26. 43
Oklahoma Oregon Pennsylvania South Carolina South Dakota Tennessee Texas Utah Virginia Washington Weat Virginia Wisconsin Wyoming New England	10.03	34. 88 58. 17 21. 61 54. 35 32. 91 14. 83 44. 72 24. 67 41. 57 31. 67 14. 16 42. 99	39. 17 46. 60 22. 17 57. 63 40. 34 13. 60 40. 84 29. 64 46. 03 28. 56 19. 31 40. 84	43. 26 56. 99 18. 47 46. 20 23. 50 10. 57 47. 41 27. 70 47. 84 33. 04 12. 69 35. 61	37. 72 35. 82 15. 90 40. 50 25. 79 14. 50 32. 55 28. 09 41. 20 27. 69 15. 62 41. 00	48. 11 42. 63 17. 73 54. 69 36. 33 12. 43 41. 60 32. 12 49. 60 35. 05 14. 58 39. 58	47. 30 42. 16 23. 21 55. 98 27. 77 16. 58 41. 95 42 02 48. 90 30. 94 18. 16 45. 45	42. 06 61. 66 17. 81 53. 13 29. 03 10. 70 42. 99 81. 93 43. 40 83. 09 14. 23 40. 48	44. 21 66. 13 20. 93 59. 78 31. 17 13. 60 45. 92 23. 67 46. 70 28. 09 15. 06 40. 08	28. 82 40. 15 18. 10 39. 80 29. 67 15. 14 24. 86 27. 28 25. 20 25. 08 14. 70 83. 47	42.47 48.39 20.77 50.30 30.59 12.67 42.55 34.50 34.40 31.48 14.17 41.53
Mean (United States)	33. 22	35. 49	36. 37	32. 26	31. 58	35. 86	37.58	35. 37	36.73	28, 81	38.74

Table 487.—Production of lumber, by States, 1879, 1889, 1899, 1909, 1919, 1929, and 1930

State	1879	1889	1899	1909	1919	1929	19301
	M ft. b. m.	Mft. b. m.	M ft. b. m.	Mft.b.m.	Mft.b.m.	M ft. b. m.	Mft.b. n
labama	251, 851	589, 480	1, 101, 386	1,691,001	1, 798, 746	2, 058, 964	1,341,6
rizona	10, 715	5 320	36, 182	62, 731	73, 655	174, 594	95. 49
rkansas	172, 503	537, 884	1, 623, 987	2, 111, 300	1, 772, 157	1, 348, 318	869, 37
alifornia	304, 795	517, 781	737, 035	1, 143, 507	1, 259, 363	1 2, 063, 229	2 1, 514, 20
oloradoonnecticut	63, 792	79, 951	133, 746	141,710	64, 864	71, 535	54.6
onnecticut	64, 427	48, 957	108, 093	168, 371	86, 705	30, 157	20, 5
ATOTOTO I	21 579	23, 466	35, 955	55, 440	27, 437	9, 641	8, 4
lorida eorgia	247, 627	411, 869	790, 373	1, 201, 734	1, 137, 432	1, 136, 897	876, 0
eorgia	451, 788	575, 152	1, 311, 917	1 342 249	893, 965	1, 386, 250	753, 4
labo	18, 204	27, 800	65, 363	1, 342, 249 645, 800	765, 388	1, 028, 791	840, 4
linois	334, 244	221, 810	388, 469	170, 181	64, 628	37, 681	25, 2
diana		755, 407	1, 036, 999	556, 418		169, 970	97, 8
W8		571, 166	352, 411	132, 021		(3)	(3)
ansas		4, 037	10, 665	4,716	2, 840	(8)	(3)
entucky	205 684	423, 185	774, 651	860, 712		339, 146 2, 232, 360 257, 910	189, 4
onisiana	305, 684 133, 472	303, 726	1, 115, 366	3, 551, 918	3, 163, 871	2 232 380	1, 606, 7
onisiana [aine	586 858	597, 481	784, 647	1, 111, 565	596, 116	257 010	222, 1
Tamband	4 127 338	82 110	183, 711	267, 939	113, 362		47. 6
Incompression	205 244	82, 119 211, 588	344, 190	361, 200	166, 841	71, 863	82.
lichima	4 179 579	4, 300, 172	3, 018, 338	1, 889, 724		571, 017	466, 8
Cimposoto	582 074	1, 084, 377	2, 342, 338	1, 561, 508	699, 639	357, 180	222, 3
limicova	168, 747	454, 417	1, 206, 265	2, 572, 669	2, 390, 135	2, 669, 496	1, 484, 3
lississippi Lissouri	399, 744	402, 052	723, 754	660, 159		228, 078	126. 7
Iontana	21, 420	89, 511	255, 685	308, 582		388, 711	296.
ebraska	13, 585	00, 011	4, 655	000, 002	505	200, 111	
· 3 -	01 2/5	8, 561	725	8	20, 335	8	8
evada.  ew Hampshire  ew Jersey  ew Mexico  ew York  orth Carolina	20,010	977 049	E70 447	649, 606	338, 777	191, 703	181, 7
ew Hampanire	100 670	277, 063 34, 052	572, 447 74, 118	61, 620	36, 888	15, 576	12.3
ew Jersey	11 108	94, 002					142,
ew Mexico	1 104 200	26, 112	30, 880	91, 987	86, 808	148, 287 159, 591	
ew York	1, 104, 220	925, 417	878, 448	681, 440			109, 6 814, 8
orth Caronna	010 000	514, 692	1, 286, 638 990, 497	2, 177, 715	1, 654, 435 280, 076	1, 202, 377 175, 537	108.
hio	910, 832	565, 315		542, 904 225, 730	280, 076 168, 403	199, 744	163,
klahoma		2, 552		225, 730	108, 403	4 704 000	3, 654,
regon,	177, 171	446, 483 2, 133, 316	734, 538 2, 333, 278	1, 898, 995 1, 462, 771	2, 577, 403	4, 784, 009 314, 250	208,
regon ennsylvania hode Island	1, 755, 844	2, 155, 516	2, 555, 275	1,402,771	630, 471		208,
TOGO ISINDO	8, 409	7, 633	18, 528	25, 489	11, 030	6, 514	707.
outh Carolina	185, 772	198, 764	466, 429	897, 660	621, 679		
outh Dakota	29, 286	6 28, 283	933, 734 950, 958	31, 657	42, 970	61, 126 763, 828	59,
ennessee	302, 673	460, 261	900, 908	1, 223, 849	792, 132	1 451 640	413,
exas	328, 968	842, 648	1, 232, 404	2,099,130	1, 379, 774	1, 451, 640	1, 045,
[tah	25, 709	14, 320	17, 548	12, 638	11, 917	5, 301	6,
ermont	822, 942	884, 476	375, 809	351, 571	218, 479	119, 622	94,
irginia	315, 939	415, 512	959, 119		1,098,038	708, 452	495,
vashington	160, 176	1, 063, 584	1, 429, 032	3, 862, 916	4, 961, 220	7, 302, 063	5, 502,
Vest Virginia	180, 117	301, 958	778, 051	1, 472, 942	763, 103	632, 992	406,
Visconsin	1, 542, 021	2, 866, 153	3, 889, 166	2, 025, 038	1, 116, 338	842, 814	636,
VashingtonVest VirginiaVisconsinVisconsinVisconsinVisconsinVisconsinVisconsingVisc	2,690	6, 417	16, 963	28,602	8, 674	25, 629	25,
li other		7 2, 816	7 6, 571	<sup>8</sup> 11, 230		9 20, 332	9 13,
United States		10 00 045 040	11 OF OCA 180	44 500 501	1119.04 220 078	18 90 000 000	11 00 OE1

Forest Service in cooperation with Bureau of the Census.

<sup>1</sup> Preliminary.
2 Includes cut of Nevada.
3 Included in "All other."
4 Includes cut of Sixtict of Columbia.
4 Includes cut of District of Columbia.
4 Includes cut of Instrict of Columbia.
5 Includes cut of North Dakota.
7 Reported as cut of North Dakota.
8 Includes cut of Nebaska and Nevada.
9 Includes cut of Iowa, Kansas, and Nebraska.
10 Excludes cutoff own, Kansas, and Nebraska.
11 Includes both merchant and custom sawing.
12 Includes 2,655 mills cutting less than 50,000 feet each per year.
13 Mills cutting less than 50,000 feet each year excluded.

Table 488.—Average value of lumber at the mill per thousand feet board measure, in stated years

Kind of wood	1899	1909	1919	1927	1929	1930
Softwoods:	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
Balsam fir	(1)	13. 99	32. 23	25. 92	25. 40	26.72
Cedar	10. 91	19.95	33.80	34. 39	34, 83	31. 14
Cypress	13. 32	20.46	38. 38	39. 91	35. 29	33. 10
Douglas fir	8. 67	12.44	24.62	19. 45	20.05	16. 91
Hemlock	9. 98	13.95	29. 16	19.00	18. 90	17.04
Larch (tamarack)	8.73	12.68	23.39	17. 69	18. 35	17. 18
Lodgepole pine	(1) 10. 12	16. 25	29 98	20.82	17. 97	17.64
Redwood	10.12	14.80	30.04	33. 81	31.00	30. 33
Spruce	11. 27	16. 91	30 76	26. 59	28. 64	23. 66
Sugar pine	12, 30	18.14	35. 99	43. 22	43. 08	38. 10
Sugar pine Western yellow pine	9.70	15. 39	27.75	26.04	26. 47	23. 52
White mr	(1)	13. 10	25.66	19.92	20. 63	17. 57
White pine	12.69	18. 16	32.83	29.90	29.87	27.81
Yellow pine	8. 46	12.69	28.71	23.77	25. 66	21,06
Hardwoods:						
Ash		24, 44	52.69	43.82	43. 14	39. 72
Basswood		19. 50	40.03	39.84	39.88	35. 51
Beech		13. 25	29.98	27. 21	28. 39	25. 89
Birch	12.50	16. 95	35.79	41, 03	39. 35	36. 39
Chestnut	13. 37	16. 12	32.30	29. 35	29. 51	23. 91
Cottonwood		18.05	32.24	30. 92	29. 70	22, 73
Elm	11.47	17. 52	36.39	36. 22	35. 28	30. 20
Gum, red and sap	9. 63	13. 20	32, 68	32, 81	34, 42	27.67
Hickory	18.78	30. 80	44.37	37.08	40. 33	83.00
Maple		15.77	35. 56	35. 35	36. 93	34, 54
Oak		20. 50	37.87	35. 72	38. 43	29, 29
Sycamore	11.04	14.87	30.32	29, 31	30. 07	26, 54
Tupelo	(1)	11.87	28.42	24, 45	25. 39	23, 47
Walnut	86.49	43.79	72.13	111.64	119. 15	100.75
Yallow poplar	14.03	25. 89	41.65	38, 58	40.66	35. 19
All kinds	11, 13	15. 38	30. 21	25, 80	26, 94	22, 81

Bureau of the Census in cooperation with the Forest Service.

Table 489.—Lumber consumption per capita, census years, 1809-1929

Year	Per capita consump- tion	Year	Per capita consump- tion	Year	Per capita consump- tion
1809 1819 1829 1839 1849 1859	Feet b. m. 55 55 65 95 225 220 340	1879	Feet b. m. 365 435 480 505 475 400 325	1924_ 1925_ 1926_ 1927_ 1928_ 1929_	Feet b. m. 345 345 345 335 300 305 275

Forest service.

<sup>1</sup> No data available.

<sup>&</sup>lt;sup>1</sup> This table takes into account the exports and imports of lumber, and in the decade, the estimated total production as well as the increases and decreases in mill and yard stocks.

Table 490 .- Pulpwood consumption, wood-pulp and paper production by States in stated years

State	Pulpv	vood co	nsum	ption	Wood	i-pulp	produ	ction	Pa	per pr	oductio	on.
State	1909	1919	1929	1930	1909	1919	1929	1930	1925	1927	1929	1930
California Louisiana Maine Massachusetts Michigan Minnesota New Hampshire New York North Carolina Ohio Oregon Pennsylvania Tennessee Vermont Virginia Washington West Virginia Wisconsin All other States	904 46 133 47 350 922 145 55 104 295	(1) 1, 280 52; 207 204 1, 055 159 27 4172 424 (3) 112 126 139 84 854	826 (5) (5) 398 (7) 25 375 956 (7)	43 280 230 243 763 (3) 351 351 353 75 24 378 1,000 (3) 1,169	26 64 37 213 686 54 27 84 136	33 106 130 232 812 61 10 4 124 215 (5) 86 82 84 39 507	29 178 190 213 663 (3) 257 213 (4) 26 206 524 (7) 734	29 193 182 138 596 (3) 4 249 189 53 25 216 566 (4) 701	868 5111 847 224 206 1,503 (3) 777 146 678 31 84 143 179 83	540 1, 004 281 207 1, 458 (3) 812 188 716 83 87 193 233 892	1, 061 562 1, 092 318 196 1, 513 749 84 73 242 382 886	491 991 279 158 1,34S 65 860 129 665 97 69 262 395 35 835
Total	4, 002	5, 478	7, 645	7, 196	2, 491	3, 518	4, 863	4, 630	9, 182	10, 002	11, 140	10, 169

Bureau of the Census in cooperation with the Forest Service.

Includes Washington.
 Included with Oregon.
 Included in "All other States."

4 Includes California.
5 Included with California.

Table 491.—Pulpwood consumption, wood-pulp and paper production of the United States

Year	Pulpwood consump- tion	Wood-pulp production	Paper pro- duction	Year	Pulpwood consump- tion	Wood-pulp production	Paper pro- duction
1899	Cords 1, 936, 310 3, 961, 176 3, 962, 660 3, 346, 953 4, 001, 607 4, 934, 306 4, 328, 052 4, 470, 763 5, 228, 558 5, 480, 075 5, 250, 794	Short tons 1, 179, 525 1, 921, 768 	Short tons 2, 167, 593 3, 106, 696  4, 216, 708  5, 270, 047  5, 919, 647 6, 061, 523	1919	Cords 5, 477, 832 6, 114, 072 4, 557, 179 5, 548, 842 5, 872, 870 5, 788, 082 6, 093, 821 6, 786, 007 6, 750, 935 7, 160, 011 7, 195, 524	Short tone 3, 517, 952 3, 521, 704 2, 875, 601 3, 621, 644 3, 783, 266 3, 962, 217 4, 394, 764 4, 313, 403 4, 510, 800 4, 862, 885 4, 630, 308	Short tone 6, 190, 361 7, 334, 614 5, 356, 317 7, 017, 800 8, 029, 482 9, 182, 204 10, 002, 070 10, 403, 338 11, 140, 235 10, 169, 140

Bureau of the Census in cooperation with the Forest Service and Federal Trade Commission.

100446°--32----59

Table 492.—Pulpwood consumption, by kinds, 1909, 1919, 1929, and 1930

Kind of wood	1909	1919	1929	1980
Spruce: Domestic	Cords 1, 653, 249	Cords 2, 313, 419	Cords 2, 074, 267	Cords 1, 844, 937
Imported	768, 332 559, 657	873, 795 795, 154	1, 029, 913 1, 309, 170 15, 379	888, 255 2 1, 222, 961
Pine: Southern yellow pine Jack pine	(2)	234, 463 51, 581	1, 036, 272 195, 577	<sup>2</sup> 1, 030, 273 200, 970
Miscéllaneous pines Poplar: Domestic	90, 885 302, 876	7, 566 180, 160	329, 466	291, 897
ImportedBalsam fir: Domestic	25, 622 95, 366	158, 220 181, 840 106, 974	157, 829 317, 552 45, 412	159, 092 830, 548
Imported. Yellow poplar. White fir. Beech, birch, and maple.	87, 176	72, 605 31, 138 8 183, 426	129, 697 111, 054 76, 950	48, 935 107, 795 90, 652 \$ 225, 147
Tamarack (larch) Other woods.		30, 355 44, 042 38, 013	39, 685 51, 835 163, 668	41, 825 40, 054 76, 681
Slabs and mill waste  Total	248, 977 4, 001, 607	175, 081 5, 477, 832	561, 285 7, 645, 011	595, 502 7, 195, 524

Bureau of the Census in Cooperation with the Forest Service.

Table 493.—Paper: Consumption by kinds, and apparent per capita, specified years, beginning 1810 1

Year	News- print	Book	Boards	Wrap- ping	Fine	All other	All kinds	Apparent per capita
1810 1819 1839 1849 1859 1859 1879 1890 1974 1904 1917 1918 1919 1921 1922 1922 1923 1925 1927 1927	569 883 1,159 1,676 1,824 1,760 2,002 2,451 2,814 3,073 3,517 3,492		short tons	short tons	short tons	short tons	Thousand short tons 2 3 3 2 78 2 127 3 127 3 127 1,121 1 2,158 3,050 4, 224 4, 244 5, 496 6, 337 6, 493 7, 861 6, 054 8, 003 9, 340 10, 500 11, 807 11, 915 12, 448 13, 351	Pounds  1 2 4 7 8 8 20 18 36 57 74 93 112 122 123 124 148 119 146 167 184 203 202 208
1980	3, 496	1,370	4,014	1,556	584	1, 251	12, 251	199

Forest Service. A computed table based on Bureau of the Census and Forest Service bulletins.

Included in "Miscellaneous pines."
 Includes a small quantity of imported hemlock,
 Includes chestnut.

Imports added to United States production and domestic exports deducted.
 Domestic production only, value of exports and imports being approximately equal.

Table 494.—Stock grazed on the national forests, and receipts, by years

Fiscal year	Cattle	Horses	Swine	Sheep	Goats	Receipts for grazing by fiscal years
1905	1, 200, 158 1, 304, 142, 1491, 385 1, 403, 873 1, 403, 925 1, 455, 922 1, 455, 922 1, 517, 045 1, 627, 321 1, 758, 198 2, 137, 857 2, 033, 800 88, 599 88, 599 1, 882, 491 1, 804, 087 1, 558, 642 1, 456, 845 1, 403, 192 1, 335, 903 1, 322, 465	Number 59, 331 (7) (7) (7) (9) (19) (9) (19) (9) (19) (19) (19) (	Number	Number 1, 709, 987 5, 762, 083 6, 980, 919 7, 679, 698 6, 980, 919 7, 578, 685 7, 371, 747 7, 467, 890 7, 780, 188 7, 586, 034 7, 935, 174 7, 271, 136 553, 263 6, 936, 377 7, 371, 136 553, 263 6, 937, 756 6, 301, 308 6, 162, 263 6, 212, 657 6, 376, 838 6, 497, 912 6, 377, 759 6, 301, 308 6, 162, 263 6, 212, 657 6, 376, 838 6, 497, 081 6, 650, 081 6, 650, 081 6, 697, 081 6, 697, 081 6, 697, 081 6, 697, 081 6, 697, 081 6, 697, 081	Number  (9) 128, 192 139, 896 90, 300 77, 688 83, 849 78, 898 65, 616 61, 409 63, 288 69, 789 60, 789 63, 885 64, 874 36, 153 31, 879 22, 088 19, 786 115, 686 117, 070 115, 487	Dollars (1) 513,000 857,005 947,385 4,022,516 989,971 997,987 4961,987 999,389 1,002,348 1,130,495 1,725,822 2,609,170 2,488,040 2,132,075 1,315,975 2,341,436 1,915,377 1,421,589 1,738,730 1,742,301

Forest Service.

Table 495.—Number of stock grazed on national forests, by States, calendar year 1930, and total grazing receipts, fiscal year 1930

Cattle	Horses	Swine	Sheep	Goats	Receipts from grazing <sup>1</sup>
Number	Number	Number	Number	Number	Dollars
173, 788	1, 533	272	<b>354, 773</b>	426	138, 481 408
145, 583 274, 941	3, 997 3, 415	179	414, 164 1, 079, 496	1,764 645	196, 413 387, 085
114, 285	7, 206		1, 365, 127		397 247, 363 166, 561
11, 255 51, 948	360 2,005		340, 855		8, 122 95, 550
130 82, 049	2,964	84	225, 577	10, 526	249 88, 999 246
2, 364	75 2,635		698, 506	60	3, 645 187, 146
26, 375 290	1, 135		32, 617 70		23, 125 212
694	7	5	428		201, 035 865 47, 377
198	12 4, 206		943 670, 650		526 166, 681
1, 321, 431	42, 357	540	6, 799, 236	13, 496	2 1, 960, 642
	Number  8 173, 788 394 145, 583 274, 941 443 114, 285 51, 948 1, 130 82, 049 2, 364 84, 754 26, 375 290 108, 491 13, 198 104, 495	Number 8 1,533 3,997 274,941 3,415 443 114,285 7,206 125,491 1,255 380 682,049 2,964 7,54 2,364 7,54 2,635 26,375 1,135 694 13,196 371 1,198 12 104,495 4,206	Number 8 2 2 2 2 3 4 4 3 4 5 4 5 6 4 4 5 4 2 6 5 6 4 5 10 4 4 4 5 4 2 6 5 6 6 4 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	Number         Number         Number         Number         Number           173, 788         1, 533         272         354, 773           394         145, 583         3, 997         179         414, 164           274, 941         3, 415         1, 079, 496         1, 483           114, 285         7, 206         1, 365, 127         638, 381           125, 491         8, 442         638, 381         360           51, 948         2, 005         340, 855         340, 855           130         6         82, 049         2, 964         84         225, 577           2, 364         76         34         34, 754         2, 635         698, 506           26, 375         1, 135         32, 617         70           108, 491         3, 982         5         788, 441           694         7         13, 196         371         187, 691           108         12         943         104, 495         4, 206         670, 650	Number         Number<

Forest Service.

No data available.
 Included with cattle.
 Included with sheep.

<sup>Subject to revision.
Last 6 months only.
Calendar year.</sup> 

<sup>1</sup> Includes grazing trespass.

<sup>\*</sup> Includes Georgia \$107, Maine \$17, and South Carolina \$9.

Table 496.—Free-use timber, cut from national forests, by States, 1910, 1920, 1929, and 1930

	Fiscal ye	ar 1910	Fiscal ye	ar 1920	Calenda 192		Calenda 193	
State	Total quantity	Esti- mated users	Total quantity	Esti- mated users	Total quantity	Esti- mated users	Total quantity	Esti- mated users
17-1	Mft.b.m.	Number	Mft.b. m.	Number 12	Mft.b.m.	Number	M ft.b.m.	Number
Alabama	184	6	4, 897	503	533	502	510	503
Alaska	5, 254	1,972	6,418	4,306	7, 574	5, 929	8, 921	4, 637
Arizona	513	536	61	2,000	25	17	132	46
Arkansas California	7. 647	3, 215	5, 238	1.606	8, 905	2, 596	3, 949	3, 203
Colorado	12,550	3, 598	9, 783	8, 920	7, 436	2, 674	9, 326	3, 120
	14, 500	32	330	96	., 200	-, 0	0,020	0, 220
Florida	80	32	10	8				
Georgia	19, 937	6,472	14, 455	5. 530	14, 936	4, 797	22,631	7, 289
Idaho	18, 951	0, 4/2	216	42	475	61	918	131
Michigan	188	15	160	64	167	46	183	40
Minnesota			8, 151	4, 290	10, 426	6, 144	16,800	11, 961
Montana	14, 713	5, 441	0, 151	3	10, 220	0, 122	10,000	11, 501
Nebraska		678		528	1, 735	419	1, 793	418
Nevada	1,710		1,777	6, 472		7, 246	15 019	7, 797
New Mexico	10,004	3, 801	8, 859 17		10, 614 778	406	15,818 709	7, 787
North Carolina			11	12	110	200	709	9/1
North Dakota	21	62		600				
Oklahoma	123	192	180		60	65	65	70
Oregon	10,068	2, 455	7, 515	1, 428	6, 360	1,382	8,882	1, 864
Pennsylvania					25	5	350	84
South Dakota	3, 476	1, 185	2, 963	910	1, 751	523	1, 755	509
Tennessee			1,027	385	656	407	607	325
Utah	8, 260	3, 426	8, 553	4, 985	11, 389	6, 788	13, 293	9, 239
Virginia			148	97	316	187	491	287
Washington	2, 444	503	1,020	251	727	237	1, 142	316
West Virginia			8	3	31	10		l
Wyoming	7,416	1,775	6, 264	1, 276	6, 849	1,684	7, 821	1,720
Total	104, 796	35, 364	88, 060	37, 336	86, 768	42, 135	116,096	53, 930

Forest Service.

Table 497.—Turpentine and rosin: Industrial consumption, calendar years 1928-1930

•		Turpentin	В		Rosin	
Industry	1928	1929	1930	1928	1929	1930
Automobiles and wagons. Chemicals and pharmaceuticals. Foundries and foundry supplies. Linoleum Matches. Miscellaneous. Oils and greases. Paper and paper size. Paint and varnish. Printing ink. Sealing wax, pitch, insulations, and plastics. Shipyards, car shops, etc. Shoe polish.	55, 235 15, 001 2, 312 250 36, 308 42, 969 4, 231 4, 306, 483 10, 131 68, 248 41, 315	Gallons 100, 815 60, 474 10, 136 81 61, 633 28, 380 6, 159 4, 630, 505 14, 232 75, 280 62, 865 567, 920 4, 215	21, 776 1, 771	500-pound barrels 1, 214 3, 709 18, 558 58, 204 2, 810 2, 555 48, 609 333, 942 245, 157 14, 815 34, 537 101 635 182, 538	barrels	500-pound barrels 3, 523 5, 246 17, 399 29, 458 2, 953 3, 752 49, 828 341, 327 192, 878 13, 104 26, 291 3, 086 610 218, 967
Total	5, 304, 099	5, 622, 695	5, 045, 224	947, 387	1, 104, 771	908, 422

Bureau of Chemistry and Soils. A few concerns did not report; to cover these, estimates were made. The estimated quantities consumed by the nonreporting concerns are less than 5 per cent of the total.

Table 498.—Hunters' licenses issued by States, with total money returns, for the seasons 1928-29 and 1929-30

			License	s issued				
State	Resi	dent		sident alien	То	tal	Money	returns 1
	1928-29	1929-30	1928-29	1929-30	1928-29	1929-30	1928-29	1929-30
Alaska Alabama Arizona Arizona Arizona Arizona Arizona Arizona Arizona Arizona Arizona Arizona Arizona Arizona Arizona Arizona Arizona Arizona California Colorado Connecticut Delaware Florida Georgia Idaho Illinois Indiana Iowa Kansas Kansas Kantucky Louisiana Minasa Maine Maryland Massachusetis Michigan Minnesota Miscouri Montana Nobraska New Hampshire New Jersey New Mexico New York North Carolina North Dakota Ohio Oklahoma Oregon Pennsylvania Rhode Island South Carolina South Dakota Onth Carolina South Dakota Tennessee Texas Utah Vermont Virginia Washington West Virginia Wisconsin Wyoming	90, 000 238, 500 2110, 084 32, 084 43, 605 43, 605 43, 605 43, 605 43, 605 43, 723 173, 116 117, 926 118, 104 218,  (7) (84, 794 129, 175 83, 000 229, 767 2110, 888 28, 465 28, 465 27, 463 27, 4	1, 500 2, 878 397 501 360 2, 439 2, 448 200 1286 3, 884 1, 800 2, 434 3,	214 223 3 950 1, 203 3 323 3 162 2 3 566 1, 342 2 248 3 470 4, 639 1, 585 2, 768 3 721 212 21, 755 3 1, 765 3 1	81,712 277,5180 91,508 91,508 91,447 110,481 36,537 2,414 44,174 88,632 80,639 173,318 104,097 108,035 112,035 112,035 112,476 122,035 112,476 123,035 112,476 112,476 113,035 117,1073 118,027 118,02	214 85,017 30, 125 84, 890 111, 211 22, 625 48, 268 86, 510 86, 510 86, 510 87, 731 143, 620 113, 660 108, 168 83, 598 73, 555 112, 446, 333 231, 435 83, 690 127, 731 119, 847 121, 171 125, 509 126, 492 127, 731 128, 732 129, 740 129, 720 129, 720 129, 720 129, 720 129, 720 121, 171 121, 525 121, 194 40, 878 151, 435 151, 435	114, 775, 35 314, 071, 50 92, 000, 00 703, 047, 87 188, 819, 50 552, 237, 00 164, 451, 50 222, 785, 50 998, 834, 70 22, 900, 00 142, (286, 00 142, (286, 00 142, (286, 00 142, 281, 00 221, 995, 05 38, 507, 60 239, 560, 30 371, 981, 00	241, 505, 25 106, 680, 00 4, 622, 00 123, 164, 00 69, 090, 67 171, 747, 85 286, 283, 283, 180 270, 261, 80 271, 282, 183, 00 100, 307, 00 115, 794, 00 115, 794, 00 115, 794, 00 121, 555, 00 122, 188, 00 191, 641, 00 21, 555, 00 191, 641, 00 21, 555, 00 191, 841, 00 112, 948, 00 1132, 948, 00 1132, 948, 00 1132, 948, 799, 00 11, 028, 748, 70 11, 029, 748, 70 11, 029, 748, 70 110, 829, 00 170, 844, 95 219, 652, 95 110, 829, 00 170, 844, 95 219, 652, 95 110, 829, 00 110, 824, 90 110, 829, 829, 829, 829, 829, 829, 829, 829	
Total 4		6, 848, 219	\$ 676 52, 062	412 54, 798	28, 721 6, 428, 761	21, 581 6, 903, 017	9, 391, 412. 33	86, 044. 50 10, 013, 925. 72

Bureau of Biological Survey.

<sup>&</sup>lt;sup>1</sup> Includes amounts received from combined hunting and fishing licenses, but not from licenses to fish

<sup>1</sup> Includes amounts received from combined minting and fishing ficenses, but not from hospises to an only.

2 No resident license required.

3 Combined funting and fishing license.

4 Totals are exclusive of Missispipi for both seasons and of Tennessee for the 1929-30 season, as the figures are not available. Figures given include combined hunting and fishing licenses, which for many States can not be separated, many such licenses being taken out by anglers only.

TABLE 499.—Current status of Federal-aid and emergency road construction as of June 30, 1931

			Unde	Under construction	a				Approved	Approved for construction	ttlon			,
State	Com-	l .		Rmergenav		МПевде				Emergency		Mileage		Federal aid funds avail-
	mileage	Estimated total cost	Federal ald allotted	advance fund 1	Initial 1 Stage 3	Stago 3	Total	total cost	redern and allotted	advance fund 1	Inf- tial 1	Stage 3	Total	projects
		Dollars	Dollars	Dollars	٦. ا	Miles		1 8	Dollars	Dollars	Miles	Miles	Miles	ars
Alabama	2, 115.8	7, 537	3, 671, 288, 23	1, 584, 430.		114.8			<b>4</b> 3	34, 601, 58		6, r	4.7	396
Arkansas	1, 737. 7	9, 139, 106, 13	4, 354, 305.88	1, 373, 157.00	335	20.5	337.7	1, 491, 745. 71	713, 622.	100 000	183	29.	88	114, 579. 63
Colorado	1,383.3	2, 28 2, 28 1, 28	5, 206, 186, 73 3, 115, 215, 63	2, 072, 208. 1, 316, 888.		8 9 9 9		88	§ <b>½</b>	51, 871, 71	55.	21.4	3,75	342
Connecticut	256.9	4.5	1, 794, 286, 20	520 50.49 50.49			2, cg	8	176, 946. 90, 012.				7.5	8,5
Florida	540.0	6, 424	3, 007, 205. 42	1,029,346.		i i'	175.6	12:	61,408	13,258			13.3	812
Idaho	2,795.0 1,281.9	e, 4 8 8	2, 297, 771, 02	1,818,777. 869,634.		32.0	304.1	88	74, 435.	137, 770.		55.0	114.2	Ė
Illinois	2, 287. 7	25,62	11, 786, 892, 09	2, 376, 700.			810.4	25	3, 778, 078.	1,012,300		4.7	276.6	38
Iowa	8, 153, 1	.7. 386	3, 144, 075, 10	1, 993, 369.		•	239.4	32	182, 458	123,000	Ì	17.4	17.4	2
Kansas	3, 148, 8	883	4, 247, 356. 40	1, 535, 965.			561.4	88	868, 140	175,947.			150.2	88.8
Louisiana	1,418.9		4,005,813.00	1, 137, 927.		19.3	286.2	82	58, 516	10,00			jui,	92
Maine	963.2	4, 337	1, 642, 395, 30	637, 799.			101.03	84	470, 583,	84,8 000,8		-	19.9	88
Massachusetts	28.	9,210,	2, 276, 626, 32	802, 509.		·	100	18	563, 500	266,98		H	12.0	8
Michigan Minnasote	1,804.8	10,783	4, 466, 907. 21	1, 108, 000.		_	88 88 88 88 88 88 88 88 88 88 88 88 88	Σξ.	1, 024, 613 546, 474	257, 500, 00		27 8 8 8	109.0	<u>5</u> 8
Mississippi	1,772.7	8	2, 013, 896, 18	1, 401, 409.		-	202	18	201,068	30,08			8	45
Missouri	2, 669. 5	9.1 9.29 9.17	3, 905, 276, 93	2, 284, 272.			311.8	24	846, 926 243, 222	213, 472			87.0	847. 18.
Nebraska	3,848.9	9,110	4, 268, 494, 24	1, 577, 666.			445.6	8	759, 179	108, 165			123.8	8
New Hampshire	7, 082, 9 392, 9	4 38.	1, 973, 134, 43 515, 208, 60	270, 056.			27.1	28	127,744	130,98	ο 4. ο 4.		10.7	8
New Jersey	0027.02	, 20g	1, 794, 968, 33	1, 103, 770.		1.	74.7	77.5	e, f		ed c	T	अंद	388 388 388
New York	2,684.0	39, 415,	18, 701, 573, 50	3, 714, 586.			607.9	32	2, 428, 525.	230,000	115.9		116.9	3
North Carolina	1, 970.4 363.2	6,585, 4,377,	8, 126, 179, 57 2, 233, 117, 39	1, 626, 473. 961, 858.		35.4	248.5	88	<u>ද</u>	233, 527, 76	8,8 0.4	88. 4. 9.	85 % 4 %	1, 608, 127, 62
Ohlo	2,563.6	15,208	4, 780, 217, 25	1,830,009.			252.7	8	1,964,856	1,168,468	95.9	প্ৰ	119.3	3
Oklahoma. Oragon	1,981,3	, v.	4, 078, 809, 67	1,601,769.			416.1	32	362, 847.	202, 814.	8; 4; 9; 4;	2. 4.	57.9	218
Pennsylvania Phodo Telenda	2,064.4	12,5	5, 194, 853, 56	2, 713, 936.		i	251.7	2	1,285	0.29	98		86	378
Trucks taking	410. %	A UAL,	970, UAV. OU.	407 000			4		Ę		•		7	4

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37, 000.00 436, 638, 91 221, 262, 73 10, 786, 65 6, 308, 66 61, 308, 66 182, 308, 00 182, 201, 115, 600, 00	885, 946. 86 8, 470, 225. 64
808.09 796.69 796.69 796.88 808.93 236.61 719.04 516.00	P46.868
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638.00 359.54 359.54 369.96 160.04 161.72 780.48 627.31 627.31 528.88	67, 308, 514, 17 12, 306.
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109, 74 133, 62 133, 63 199, 78 199, 78 199, 62 286, 62 286, 64 286, 6	244.08
4,8,4,9,1, 4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,	92 172, 587,
297. 98 502. 88 872. 15 872. 56 878. 97 760. 18 992. 87 102. 15 261. 82 178. 27	991. 92
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Bouth Carolina Bouth Dakota Tennessee Tennessee Tyeza Utah Virginia Warmout Wirginia West Virginia West Virginia West Virginia West Virginia Henvalia	Total

1 On Dec. 20, 1930, an emergency advance fund of \$30,000,000 was authorized to be advanced to the States as a loan and to be used in matching regular Federal-aid authorizations supportionments.

1 This fund was available for use only on work performed prior to Sept. 1, 1931. The Federal government is to be repaid for such leans by deductions from subsequent Federal-aid approximates.

2 Initial Federal-aid construction refers to projects which are being improved with Federal aid for the first time. Such projects may not have been previously improved.

3 The term stage construction refers to additional work done on projects previously improved with Federal aid. In general, such additional work consists of the construction of a surface of higher type than was provided in the initial improvement.

Table 500.—Federal-aid highway system: Mileage, Federal-aid apportionment for fiscal year 1932, and total apportionment for years 1917 to 1933, inclusive

State	Mileage in ap- proved system June 30, 1931	Apportionment for fiscal year 1933 <sup>1</sup>	Aggregates of apportionments for fiscal years 1917 to 1933, in- clusive
Alabama Arizona Arkansas California Colorado Connecticut Delaware Florida Georgia Idaho Illinois Indiana Iowa Kansas Kentucky Louisiana Maryland Maryland Marsachusetts Michigan Minnesota Mississippi Missouri Montana Nebraska New Hampehire New Jersey New Marco New Hork North Carolina South Dakota Ohlo Oklahoma Oregon Pennsylvania Rhode Island South Dakota Tennessee Texas Utah Vermont Virginia Washington West Virginia Washington	Miles 3, 931 1, 953 4, 953 4, 554 4, 554 6, 740 1, 557 6, 740 1, 557 6, 740 1, 557 1, 582 1, 557 1, 582 1, 557 1, 583 1, 573 1, 583 1, 573 1, 583 1, 573 1, 583 1, 573 1, 583 1, 573 1, 583 1, 573 1, 583 1, 573 1, 583 1, 583 1, 775 1, 783 1,	## Amount \$2, 250, 169, 00 1, 556, 080, 80 1, 346, 477, 80 4, 121, 029, 40 1, 988, 953, 60 687, 401, 80 529, 375, 304, 80 1, 330, 448, 00 4, 476, 553, 80 2, 698, 897, 20 2, 789, 806, 80 2, 789, 806, 80 1, 994, 012, 00 1, 537, 800, 80 1, 994, 012, 00 1, 537, 800, 80 1, 994, 1012, 00 1, 537, 800, 80 1, 994, 1012, 00 1, 537, 800, 80 1, 534, 416, 40 2, 256, 040, 80 1, 511, 244, 00 2, 256, 040, 80 1, 531, 244, 50 2, 255, 040, 80 1, 534, 508, 80 1, 732, 343, 40 1, 732, 343, 40 1, 732, 343, 40 1, 732, 343, 40 1, 732, 343, 40 1, 732, 343, 40 1, 732, 343, 40 1, 732, 343, 60 1, 681, 200, 70 1, 680, 40 2, 557, 260, 60 1, 681, 216, 40 2, 256, 603, 80 1, 765, 764, 40 2, 256, 770, 221, 00 1, 221, 50 1, 992, 380, 60 1, 681, 216, 40 1, 223, 375, 00 1, 992, 380, 60 1, 681, 216, 40 1, 223, 375, 00 1, 992, 380, 60 1, 681, 216, 40 1, 223, 375, 00 1, 681, 216, 40 1, 223, 375, 00 1, 681, 216, 40 1, 223, 375, 00 1, 681, 216, 40 1, 223, 375, 00 1, 681, 216, 40 1, 223, 375, 00 1, 681, 216, 40 1, 223, 375, 00 1, 681, 216, 40 1, 223, 375, 00 1, 681, 216, 40 1, 223, 375, 00 1, 681, 216, 40 1, 223, 375, 00 1, 681, 216, 40 1, 223, 375, 00 1, 681, 216, 40 1, 223, 375, 00 1, 681, 216, 40 1, 223, 375, 00 1, 681, 216, 40 1, 223, 275, 20 1, 223,	4mount \$26, 466, 617. 00 17, 893, 597. 89 21, 632, 105, 60 42, 020, 084, 40 42, 103, 140. 60 8, 036, 662, 00 15, 315, 654, 40 33, 759, 273. 80 15, 805, 218. 10 54, 049, 531, 90 35, 363, 301, 792, 20 35, 363, 801, 90 24, 183, 801, 00 17, 363, 278, 60 11, 699, 768, 20 11, 699, 768, 20 11, 699, 768, 20 11, 699, 768, 20 11, 699, 768, 20 11, 699, 768, 20 11, 699, 768, 20 11, 699, 768, 20 11, 699, 768, 20 11, 699, 768, 20 11, 699, 768, 20 11, 699, 768, 20 11, 699, 768, 20 11, 699, 768, 20 11, 699, 768, 20 20, 207, 882, 60 20, 243, 450, 40 62, 299, 699, 80 20, 163, 944, 00 20, 057, 882, 60 47, 164, 03, 40 20, 205, 543, 60 20, 205, 543, 60 20, 205, 543, 60 20, 770, 404, 40 27, 794, 856, 60 20, 770, 404, 40 27, 794, 856, 60 20, 772, 404, 40 27, 794, 856, 60 20, 772, 404, 40 27, 794, 856, 60 20, 772, 404, 40 27, 794, 856, 60 21, 152, 132, 308, 40 115, 141, 242, 308, 40 115, 142, 308, 40 115, 143, 308, 40 115, 144, 24, 348, 40 115, 144, 24, 388, 40 115, 144, 24, 388, 40 115, 144, 388, 40 115, 144, 388, 40 115, 144, 388, 40 115, 144, 10
Wyoming Hawaii	3, 498 217	2, 640, 713, 00 1, 359, 009, 40 529, 375, 00	31, 834, 206, 00 15, 882, 307, 40 3, 619, 923, 00
Total	196, 877	105, 875, 000. 00	1, 240, 875, 000. 00

<sup>1</sup> Net apportionment after deduction of \$16,000,000 in repayment of emergency advance funds.

Table 501.—Mileage of roads in State highway systems, including Federal-aid system, at end of 1930 and total mileage 1921, 1923-1930, as reported by State highway departments

		Earth surf		Surfaced roads by types							
State		proved	Im- proved to grade	Total sur- faced mile- age	Sand- clay, top- soil	Gravel, chert, etc.	Water- bound mac- adam (treated and untreat- ed)	Bitu- mi- nous mac- adam	Bitu- mi- nous con- crete (in- clud- ing sheet as- phalt)	Port- land ce- ment con- crete	Brick and block
Alabama Arizona Arkansas California Colorado Connecticut Delaware Florida Georgia Idaho Illinois Indiana Iowa Kansas Kentucky Louisiana Mare Maryland Massachusetts Michigan Minnesota Mississipi Missouri Mostana Nebraska Nevada New Hampshire New Jersey New Hampshire New Jersey New Mexico New York North Dakota Ohio Okiahoma Oregon Pennsylvania Rhode Island South Carolina South Dakota Ohio South Oarolina South Dakota Tennessee Texas Utah Vermont Virginia Washington West Virginia Washington West Virginia Wisconsin Wyoming	Miles 5, 526 2, 633 8, 810 6, 589 9, 234 2, 234 817 6, 663 7, 124	Miles 1, 127 475 632 1, 677 4, 176 2, 654 2, 853 1, 361	Miles 811 294 1, 312 430 683 95	Miles 3, 588 1, 864 6, 866 4, 482 4, 375 2, 139 817 3, 794 3, 916	76 812	1, 826 1, 504 5, 697 1, 813 3, 905 302 47	Miles 28	Miles 165 24 136 399 304 48 148 299	Miles 124 66 350 636 14 155 19 234 167	486	1 6 288
Idaho Illinois Indiana Iowa Kansas Kentucky Louisiana Maine Maryland	4, 565 9, 889 6, 111 7, 685 8, 690 15, 000 10, 509 2, 039 3, 253	1, 361 1, 923 636 8, 945 6, 223 2, 662 152	4445 263 125 513 505 623 298	2,759 7,703 5,986 6,536 4,240 8,154 7,549 1,886	2, 635	2, 517 3 1, 875 3, 039 487 3, 162 6, 864	3, 984 8, 984 7 8	222 3 544 172 525 16 237 48	152 16 44 21 123	57, 541 2, 459 3, 464 781 436 533 129 1, 386	139 90 83 162 26 6
Massachusetts Michigan Minnesota Mississippi Missouri Montana Nebraska Nevada New Hampshire	1, 624 8, 109 6, 891 6, 101 8, 446 8, 148 9, 752 3, 774 2, 548	459 170 2, 043 5, 648 4, 316 1, 902	93 97 5 <del>04</del> 765 654 652 131 103	1, 624 7, 557 6, 794 5, 337 5, 638 1, 846 4, 784 1, 741 2, 434	100 195 1 51 84	5, 165 4, 853 2, 918 1, 737	194 537	852 111 51 130 17 26 173	230 381 77 21 7 17 2 56	2, 928 1, 340 387	3 12 17 13 21 51
New Jersey New Mexico New York North Carolina North Dakota Ohio Oklahoma Oregon Pennsylvania	1, 873 9, 334 14, 015 8, 705 7, 401 11, 343 6, 395 4, 352 13, 501	15, 016 2, 720 118 2, 679 27 2, 475 339	17 1, 647 51 857 1, 539 62	1,841 2,671 11,244 7,730 3,183	2, 977	216 2, 585 124	1, 672 190 1, 435	3, 638 598 1, 591 324 408	1 434 957 1 435 275 684 484	5, 133 2, 434 10 2, 268 1, 279	243 36 1, 420 40
Rhode Island South Carolina South Dakota Tennessee Texas Utah Vermont Virginia	1,009 5,993 5,976 7,044 18,703 3,436 4,204 7,688	257 887 628 447 5, 485 360 34 1, 511	181 240 1, 364 637 2, 410 1, 172 618 575	571 4, 866 3, 984 5, 960 10, 808 1, 904 3, 552 5, 602	2, 842 20 938	26 514 3, 911 2, 534 6, 000 1, 605 2, 168	1,329 990 49 1,283	204 11 8 782 503 5	124 445 218 199 67	111 1,011 4,1 1,080 2,122 222 250 693	5 5 7 7
West Virginia. Wisconsin. Wyoming. Total, 1980	4, 164 10, 221 3, 127 324, 496	971 69, 910	469 856 506 28, 365	9, 865 1, 650 226, 221	15, 15	5, 431 1, 614 2 106, 725	198 531 5 20, 229	14, 590	153 16 27 8, 071	3, 19 58, 20	2 134 3 8 3, 245
Total—1929	314, 163 306, 442 293, 353 287, 925 274, 913 261, 216 251, 613 209, 242	77, 259 81, 549 86, 817 3 96, 413 103, 271 3 94, 651 103, 845 2 102, 96	28, 553 31, 755 29, 970 28, 456 26, 786 34, 456 36, 368 21, 421	208, 32- 193, 13- 176, 56- 163, 05- 144, 85- 132, 10- 111, 40- 184, 85-	115, 445 8 13, 496 8 12, 58 9 11, 396 4 11, 02 9 10, 446 0 8, 87 8 8, 62	2 97, 83; 93, 12; 1 86, 09; 79, 28; 68, 77, 6 63, 15; 52, 91; 2 36, 45	18,422 1 16,709 8 17,083 7 15,423	12, 92, 12, 10, 10, 34	6, 398 7 5, 701 5 5, 414 8 5, 21	050, 58 042, 95 336, 91 531, 93 427, 64 122, 82 317, 91 010, 11	7 3, 32 5 3, 32 6 3, 38 5 3, 18 5 3, 09

<sup>1</sup> Includes 1,008 miles of miscellaneous surfacing not allocated by types.

Table 502.—Total State highway income and funds available 1930, as reported by State authorities

State	Total funds	Bal- ances at	Total income for	State taxes and ap-	Motor vehicle	Gasoline tax	From counties and	State high- way	Federal aid road
Diese	available	first of year	State highways	propri- ations	fees	receipts	miscel- laneous	bonds sold	funds used
	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	dollars	dollars	dollars	dollars	dollars	dollars	dollars	dollars	dollars
Alabama	17, 655	3, 360 457	14, 295 4, 873	709	2, 851 778	3, 506 1, 662	1,070 66	5, 251	1, 61°
ArizonaArkansas	5, 330 48, 365	1, 147	47, 218	109	2,607	6,729	54	35, 580	2, 24
California	49.744	13, 646	36, 098	4, 597	4, 195	22, 433	941		3, 93
Colorado Connecticut	10,086	2, 177 1, 107	7, 909 14, 783	471	834	4, 171	134		
Connecticut	15,890	1, 107	14, 783		8, 430	4, 481	1,383		48
Delaware Florida	8,710	957	8, 704 9, 975	5, 579	1,611 3,376	1,033 4,528	100 841		38 1, 23
riorioa	10, 932 14, 339	719	13, 620		4, 190	8,066	791		57
Georgia Idaho	6, 780	459	6, 321	325	193	2, 959	828	1,000	1, 01
Olinois	70, 108	6, 664	63, 444	167	18, 354	140, 486	347		4.09
ndiana	24.055	706	23, 349		6, 019	214, 194	1,064		2,07
[owa	56,077	7, 281	48, 796		11,902	5, 965	264	<sup>3</sup> 26, 789	3, 87
Kansas	19. 364	1, 537	17, 827		5, 965	9, 047 8, 483	442		2,37
Kentucky Louisiana	28, 788 33, 519	2, 737 7, 573	26,051 25 946	820 429	4, 148	7, 335	2,080	8,449 11,260	2, 57 18
Maine	17, 711	1,021	16, 690	1,044	4, 632 3, 103	4, 612	2, 106 3, 380	3 335	1, 21
Maryland	20, 148	4, 045	16, 103	2 723	2, 458	5, 866	1, 922	8, 335 2, 377	7,75
Maryland Massachusetts	29, 214	5,345	23, 869	2, 723 1, 150	2, 458 7, 186	10, 505	3, 764		1.26
Michigan	51, 448	2,851	48, 597		22, 041	21, 825	2, 428		2,30
Minnesota	46, 670	11,668	35,002	1,960	11,008	9, 173	34	9, 177	3,65
Michigan Minnesota Mississippi Missouri	5, 298	790	4, 508		72	2, 817 8, 789	1, 157	-55-555-	46
Vissouri Montana	48, 922 6, 015	5, 826 158	43, 096 5, 857		10, 049	2,978	723 253	20, 053	3, 48 2, 62
Cahracka	11 480	870	10, 599	107	1, 275	7,021	103		2.08
Novada New Hampshire Yew Jersey New Mexico	2, 529	101	2, 428	108	366	675	161		1,12
vew Hampshire	10, 995	2, 109	8,886		2,057	2.470	1,964	1,500	7 88
ew Jersey	67, 714	9.270	58, 474	11, 992	14, 097	10, 911	772	20,001	70
Yew Mexico	9, 643	1,025	8,618	197	541	2, 737	142	3, 487	1,56
Yow York	145, 158	75,664	69, 494	6, 709	28, 261	21, 357	9, 549		3, 6
Vorth Carolina Vorth Dakota	29, 347 4, 195	8, 561 359	20, 786 3, 836		7,026 978	12,895	154 390		1, 20
Ohio	49, 764	8,976	40, 788		6, 745	23, 064	6, 479		
)klahoma	21 001	2, 284	18, 717	209	2,917	8, 752	2, 376		4.46
regon	17 025	1, 267	18, 717 15, 758		6, 228	6, 102	331	1, 532	1, 56
ennsylvania Rhode Island	103, 895	29, 117	74,778		33, 828	28, 820	6, 405		5, 72
Rhode Island	4, 493	1,573	2,920	322	1, 698	702	62		13
South Carolina South Dakota	38, 662 9, 078	7,032 3,326	31, 630		2, 687	6, 484 2, 810	1, 512 94	20, 475	47
Cennessee	78, 959	23, 745	5, 752 55, 214	73 656	1, 557 4, 538	10,016	1, 913	36, 631	1,21
rezas	52, 290	10, 149	42, 150	000	4,626	21, 181	10, 412	30,001	5.93
Jtah	5, 263	425	4.838		395	2.439	1.083		92
7ermont	8,811	1,077	7,734	822	2, 439	1,875 7,724	1,821	441	88
Jirginia	21,862	3, 758	18, 104	2,550	6,091	7,724	643		1,0
v asnington	15,806		15,806		8,000	6,456	93		1.2
v est v irginia Viceorcia	32, 126 33, 919	5, 918 7, 178	26, 208 26, 741	7	4,730	5, 441		15,000	1,0
Vashington Vest Virginia Visconsin Vyoming	3, 953	470	3, 483	94	12,038	7, 191	4, 446		3.00 1.01
									<del> </del>
Total	1, 423, 164	286, 491	1, 136, 673	43, 318	289, 802	411, 109	77, 693	222, 288	92.46

<sup>1</sup> Includes taxes held by court, from 1927 \$6,310,565, and 1929 \$11,659,778.
2 Includes loan by counties of their share of gasoline tax, \$1,600,000.
3 Issued by counties for State primary roads.

Table 503.—Total State highway road and bridge disbursements, 1930, as reported by State authorities

State		G	Expenditures for State highway purposes  Other disbursements by State highway departments								
Alabama	State	burse-	expend- iture for State high-	struc- tion and right		laneous ex-	ment, mate-	est on	ment of	funds trans-	Other obliga- tions as- sumed
	Arizona Arizona Arkansas California Colorado Connecticut Delaware Florida Georgia Idaho Illinois Indiana Iowa Kansas Kentucky Louisiana Maryland Maryland Maryland Minnesota Michigan Minnesota Mississippi Missouri Montana Nevada Nevada Nevada Nevada New Hampshire New Jersey New Mexico New York North Carolina North Carolina North Dakota Oho Coregon Pennsylvania Rhode Island South Carolina South Carolina South Carolina South Carolina South Dakota Tennessee Texas	dilars 15, 233 38, 821 37, 741 15, 223 37, 144 15, 223 37, 144 15, 223 12, 637 48, 554 22, 569 26, 608 16, 497 17, 192 21, 17, 192 24, 136 34, 283 35, 221 21, 183 22, 513 24, 133 25, 613 27, 114 27, 114 28, 138 28,	dollars 13, 9020 29, 9636 87, 384 14, 351 12, 9804 12, 9804 12, 9804 12, 9804 12, 9804 12, 9804 12, 9804 12, 9804 12, 9804 12, 9804 12, 9804 12, 9804 12, 9804 12, 9804 12, 9804 12, 9804 13, 244 14, 9804 13, 244 14, 9804 14, 9804 14, 9804 14, 9804 14, 9804 14, 9804 16, 9804 17, 9804 18, 9804 18, 9804 19, 9804 19, 9804 19, 9804 19, 9804 19, 9804 19, 9804 11, 9804	dollars 328.00	dollars 1,486 1,486 1,4954 6,4858 1,610 1,2,954 6,18,240 1,2,376 1,3,64 1,3,958 1,2,187 1,3,076 1,3,07	22 40 90 2 47 78 241 241 2 3 838 39 12 1 351 11	dollars 595 1188 239 46 266 234 52 1384 52 1384 2287 1, 228 808 417 227 112 246 87 724 613 227 112 246 87 7254 613 227 1, 288 87 721 246 87 7254 613 207 112 246 87 7254 613 306 103 306	dollars 2, 312 2, 140 2, 821 192 37 154 5, 975 2, 699 1, 434 7, 434 7, 290 2, 572 2, 249 1, 290 2, 572 2, 449 1, 290 1, 3, 665 4, 530 4, 777 1, 420 3, 963 1, 803 1, 803 1, 803 1, 803	dollars 1, 445 7, 423 1, 775 7, 885 159 2, 000 1, 090 340 3431 1, 871 684 1, 833 12, 065 1, 000 2, 600 1, 925 2, 937 385 112, 488 4380 11, 000 1, 000	1, 797	1, 682 736 44
			19,806 3,471	15, 528 2, 249	4,263 1,064		63	95	110	4,652	1,16

Table 504.—Mileage of county and local roads at end of 1930, from records and reports of local authorities

				8	urfaced	roads by	types			
State	Total mile- age local roads	Earth nonsur- faced	Total surfaced mile- age	Sand- clay top- soil	Gravel- chert, etc.	Water- bound mac- adam (treated and un- treated)	Bitu- mi- nous mac- adam	Bitu- mi- nous con- creto (in- cludes sheet as- phalt)	Port- land co- ment con- crete	Brick and block
Alabama Arkona Arkansas California Colorado Connecticut Delaware Florida Georgia dasho Ulinois Indiana	Mites 62, 381 20, 185	Miles 46, 185 18, 209 58, 021 49, 210	Miles 16, 196 1, 976 2, 018	383	Miles 7, 523 1, 203	Miles 292 26	Miles 79 14	Miles 86 73	Miles 117 277	6
Arkansas	60, 039 70, 375	58, 021 49, 210	2, 018 21, 165	210	1,749 11,725	46 2, 057	7 3, 677	1, 297	2, 40 <del>9</del>	
Colorado	59, 740 12, 022	56, 527 10, 449	3, 213 1, 573	1, 381	1, 826 985	396	91	8	6 91	
Delaware	2, 962 23, 703	2, 521	441		161	226	18	31	4	1
FloridaGeorgia	23, 703 95, 160	2, 521 12, 102 84, 154 28, 253	11, 601 11, 006	3, 954 9, 143 2, 054	962 1, 291	5, 312 75	108 264	694 31	57 200	514
Idaho	95, 160 35, 260 87, 398	28, 253 72, 286	11, 006 7, 007 15, 112	2,054	4, 895 12, 798	429	46 86	8 23	1, 658	118
Indiana	67, 657	21, 609	46,048		42 ORR	1 126	322	188	1,300	146
Iowa	95, 643 123, 550	82, 091 120, 763	13, 552 2, 787	500	13, 544 2, 100 3, 101	69	42	13	61	
Kentucky	46, 261 25, 044	36, 761 20, 390	2,787 9,500 4,654	165 60	3, 101	6, 132 11	71 5	7	24 1	
Maine	18, 843	14, 502	4, 341 3, 055	8	4, 570 4, 295	13	18		6	
Maryland Massachusetts	11, 594 17, 178	8, 539 9, 120	8,058	17	1, 610 5, 355	738	20 1, 425	414	309 93	
Michigan	72, 997 103, 770	54, 273	18, 724 30, 423	5, 927	15, 256 24, 234	1, 398 101	217	194 29	1, 567 130	1 8
Mississippi	55, 856	73, 347 43, 243	12, 613	204	12.155	18	57	78	95	
Missouri	102, 094 58, 924	93, 406 56, 900	12, 613 8, 688 2, 024	1, 200 120	5, 543 1, 900	1,450	175	53	267	1
Nebraska	84, 155	82, 553	1,602	1 500	1.045	i 5			33	
New Hampshire	19, 802 9, 486	19, 099 8, 860	703 626	38 24	562	24	11 13	2	1	
New Jersey	15, 520 88 442	8, 860 7, 919 33, 099 45, 326 30, 865	7, 601 343	162 78	3, 834 265	1, 155	661	926		1
New York	38, 442 68, 360	45, 326	23, 034		10, 599	4, 147	6, 890	71	1, 303	2
North Carolina North Dakota	45, 091 99, 445	30, 865 98, 602			850 843	175	137	231	204	34
Ohio	78, 763	04 707	00 700		30, 687	5. 115	2, 682	114	739 96	24
Oregon	114, 484 47, 265	34, 181 112, 518 36, 938 59, 780 1, 209 37, 797	1, 966 10, 327	169 350	8, 270	1,200	11	350		
Pennsylvania Phode Island	47, 265 77, 366 1, 730	59, 780	17, 586 521		12, 491 278	2,487	i 601	696 13	834 3	
South Carolina	1, 730 51, 733 114, 295	37, 797	13, 936	13, 197	572	7	10		95	
Tennessee	114, 295	111, 183 48, 851	3, 112 12, 058	286	3, 112 8, 296	1 2 924	558		44	
Texas	169, 836 20, 219	154, 220	15,616	2.584	12,300	467	40	46	179	
Vermont	10, 827 52, 269	17, 672 9, 304 45, 290	2, 547 1, 523 6, 979	144	1. 375		5	3		
Virginia Washington	52, 269 40, 633	45, 290 26, 610	6, 979 14, 023	8, 849 975	1,712 10,278	1,320 1,704	83 44	124	15 763	
West Virginia.	30, 635	28,430	2 205		655	690	461		255	6
Wisconsin Wyoming	71, 563 38, 106	51, 296 37, 769	20, 267	3, 391	15, 542 240	951			383	
Total			467, 338	71, 907	310, 308		19,059	6, 019	14, 656	1, 86
Total_1090	2 710 000	9 955 900	454 720							_
Total—1929	2, 709, 839	2, 276, 840	454, 111 432, 999	75, 547 74, 562	292, 463 277, 797	48, 760 46, 454	16, 692 14, 953	5, 596 5, 235	13, 254 12, 317	1,79
1927	2, 720, 231	2, 308, 076	412, 155 387, 005	71, 770	263, 088 245, 524	45,500	14, 953 13, 525	5, 235 5, 134 5, 155	11, 438 10, 405	a 7.70
1925	2, 731, 172	2, 354, 766	1 376, 406	ווא אה נ	224, 036	65, 604	11,651 10,490	5,341	1 10.106	1 2 05
1924	2, 743, 195 2, 744, 118	2, 403, 637 2, 418, 175	2 339, 558 3 327, 941	53, 638 52, 425 54, 717	193, 465 186, 314	65, 604 60, 139 59, 200	7, 853 6 950	4.480	8, 363 7, 289	1, 62 1, 56
1921	2 732 052	2 429 150	4 302, 902	54 717	163, 441	60, 367	6, 950 3, 515	3, 739	5, 497	1,33

Includes 559 miles of miscellaneous types.
 Includes 9,996 miles of miscellaneous types.

Includes 9,975 miles of miscellaneous types.
 Includes 10,295 miles of miscellaneous types.

Table 505.—Income and funds available for local roads, 1930, compiled from records of local authorities

State	Total funds avail- able	Balance at first of year	Total income for local roads	Local road bond sales	Local road taxes and ap- propria- tion		Gaso- line-tax receipts	Funds from State for local roads	Miscel- laneous income
Alabama Arizona Arkansas California Colorado Connecticut Delaware Florida Georgia Idabo Illinois Indiana	3,897 2,048 32,656 14,886 9,459 40,129 47,519 28,884	1,000 dollars 1,305 142 347 15,060 434 85 272 12,419 1,739 2,392 	1,000 dollars 11,721 2,663 9,553 34,121 5,882 1,776 20,23,147 7,067 40,129 37,263 26,269 19,395	1,000 dollars 2,084 390 881 23 531 1,044 1,350 8,110 313 1,639	1,000 dollars 5,636 920 2,100 17,721 3,812 1,119 8,855 9,635 3,672 19,600 24,900 18,742 13,051	1,000 dollars 73 44 1,027 8,553 627 1,215 1,668	1,000 dollars 3,374 1,034 6,368 10,451 1,587 7,011 2,145 17,304 4,250 4,059 1,750	1,000 dollars 93 394 315 610 341 1,775	1,000 dollars 554 182 58 1,121 329 
Kansasa. Kentucky Louisiana. Maine. Maryland Massachusetts. Michigan. Minnesota. Mississippi. Missouri. Montana. Nebraska. Nebraska.	8, 813 12, 950 3, 170 6, 021 14, 550 58, 286 27, 004 36, 025 20, 120 5, 022 12, 920	3,038 -34 -43 167 12,070 1,201 12,569 1,300 325 1,360 471	8, 813 9, 912 8, 204 6, 064 14, 383 46, 216 25, 803 23, 456 18, 820 4, 697 11, 560 758	2,000 500 40 2,072 400 7,100 1,045 1,697 7,700 100 25 75	6,000 9,250 3,064 3,823 10,234 25,500 17,846 13,893 9,600 2,820 6,290	563	4, 624 3, 453 4, 075	3, 336 1, 542 1, 869 50	250 162 100 169 413 1,450 1,590 934 1,520 200 400
Nevada New Hampshire New Jersey New Mexico New York North Oarolina North Dakota Ohio Okiahoma Oregon Pennsylvania Rhode Island South Carolina	3, 674 28, 584 501 55, 497 9, 780 5, 549 87, 701 18, 000 10, 890 89, 308	394 69 4,596 2,706 1,845 9,718 1,862 915 18,409 15 3,993	3, 674 28, 190 432 50, 901 7, 074 3, 704 77, 983 16, 138 9, 475 70, 899 1, 210 9, 269	3,796 448 29,001 800 1,250 5,420 105 272	3, 582 17, 827 231 33, 567 5, 862 2, 276 41, 157 8, 010 47, 570 1, 094 8, 487	5, 950 201 6, 088 783 1, 794 8, 922 1, 010	5, 695 645 5, 719 2, 887 4, 644	89 477 5, 551 283 	_ 11
South Carolina South Dakota Tannessee Texas Utah Vermont Virginia Washington West Virginia Wisconsin Wyoming Total	6,895 22,355 43,000 2,297 1,000 9,590 12,526 14,218 47,529 1,206		32,138 1,941 1,000 8,070 11,046 11,180 43,474 1,204	282 3,245 4,000 193 212 100 1,072 5,370	5, 208 7, 811 19, 050 1, 604 700 4, 437 6, 800 10, 103 26, 499 740	830	3, 032 2, 416 4, 648 300	6, 551 77	124 144 389 500 5 406 87

Table 506.—Disbursements for local roads, 1930, compiled from records of local authorities

		Exp	enditures	for local	road purp	oses	Other d ments h autho	isburse- oy local rities
State	Total disburse- ments	Total expend- itures for local roads	Con- struction	Mainte- nance	Miscel- laneous and over- head <sup>1</sup>	Interest on bonds	Princi- pal pay- ments on bonds	Funds trans- ferred to State
Alahama Arkansas California Colorado Connecticut Delaware Florida Georgia Idaho Illinois Indiana Iowa Kanses Kentucky Louisiana Maryland Massachusetts Michigan Minnesota Mississippi Alissouri Montana Nebraska New Hampshire New Hampshire New Hampshire Now Jersey New Merico New Holo New Holo New Holo New Holo New Holo North Dakota Ohio Oklaboma Oregon Pennsylvania Rhode Island South Carolina South Tarolina South Tarolina South Tarolina South Tarolina South Dakota Tennessee Tenna Utah Vermont Virginia Washington West Vinginia Washington West Vinginia West Vinginia West Vinginia West Vinginia West Vinginia West Vinginia West Vinginia West Vinginia West Vinginia Wisconsin Wyoming	48, 610 25, 88 8 18, 870 4, 950 11, 240 8, 674 28, 289 55, 000 14, 142 55, 000 14, 180 76, 724 15, 702 10, 180 76, 724 11, 260 11, 260 11, 260 11, 260 11, 180 11, 180	1,000 dollars 10,957 4,440 31,257 4,440 31,257 11,607 17,257 11,5212 33,052 24,440 16,175 6,850 24,440 41,425 24,143 37,07 715 24,281 48,370 41,819 48,800 11,819 48,800 11,819 48,800 11,819 48,800 11,819 48,800 11,819 48,800 11,819 48,800 11,819 48,800 11,819 48,800 11,819 48,952 48,800 11,819 56,488 54,800 11,819 56,488 54,800 11,819 56,488 14,564 15,607 7,963 10,510 11,041	1,000 dollars 3,204 1,700 10,153 519 1,385 519 2,507 1,557 14,000 10,450 9,174 11,075 12,200 3,003 5,242 20,400 15,542 10,705 1,200 10,749 28,880 24,20 25,545 10,749 28,880 24,20 31,305 36,000 31,305 28,100 31,305 31,30	1,000 dollars 6,105 1,467 14,130 14,002 2,991 5,774 6,500 5,774 6,500 12,140 12,975 3,250 1,853 6,000 1,853 1,850 1,853 1,850 1,853 1,850 1,853 1,850 1,853 1,850 1,853 1,850 1,853 1,850 1,853 1,850	1,000 dollars 1,001 4,082 515 26 16 1,761 1,478 935 715 1,501 2,260 400 400 48 458 2,425 2,425 2,025 350 675 522 3,502 1,634 274 274 274 274 275 689 162 2,894 287 689 162 2,894 162 1,890 71	1,000 dollars 1,638 219 2,700 2,911 16 344 303 7,215 1,883 1,250 1,950 6,428 3,000 219 49 4,833	1,000 dollars 763 4,700 3,985 284 4,700 3,202 212 47 2,232 1,607 1,446 1,300 10,550 1,578 1,300 700 30,974 3,208 1,000 8,209 30,974 3,208 1,000 8,209 7,000 30,974 3,208 1,000 8,209 7,000 30,974 3,208 1,000 8,209 7,000 30,974 3,208 1,000 8,209 7,000 30,974 3,208 1,000 8,209 7,000 30,974 3,208 1,000 8,209 7,000 30,974 3,208 1,000 8,209 7,000 30,974 3,208 1,000 8,209 7,000 30,974 3,208 1,000 8,209 7,000 30,974 3,208 1,000 8,209 7,000 30,974 3,208 1,000 8,209 7,000 30,974 3,208 3,208 3,203	1,000 dollars 374
Total	851, 687	700, 495	296, 531	284, 229	87, 067	82, 605	112, 577	38, 618

<sup>1</sup> Administration and engineering included.

Table 507.-Motor vehicle registration 1930, as reported by State authorities

		ed motor v		70.00	-		oflicenses ermits	Year's in in regist	
State	All motor cars and trucks	Passenger autos, taxis and busses	Motor trucks and road tractors	Regis- tered motor cycles	Tax- exempt motor vehicles	Dealers' licenses	Opera- tors' and chauf- feurs' permits	Num- ber	Percent
labama	277, 146	239, 170	37, 976	663	1, 368	4, 181	2, 989	-8, 387	-2.9
rizona	110, 525	98, 480	12,045	390	1, 457	117	13, 468	1, 512	1.4
rkansas	220, 204	193, 218	26, 986	380	939	481	5, 137	-12, 924	5. 5
alifornia			230, 387	9, 405	18, 122	3, 325		67, 015	3.4
Colorado	308, 509	276, 847	31,662	1, 059	283	3, 474	7, 296	5, 020	1.7
Delaware	331, 026 56, 109	279, 830	51, 196 10, 576	2, 371 295	2, 390		409, 557	2, 963	0.9 2.1
District of Columbia	156, 676	45, 533 139, 733	16, 948	903	9 410	680	63, 452 71, 743	1, 149 5, 226	3.4
Florida	827, 801	274, 705	53, 096	1, 490	3, 412 3, 871	1,759 1,724			-5.2
Jantoia	241 580	204 481	47, 119	1, 178	984	2,798	2, 514 3, 045	-17, 325	-4.8
daho	119 077	104, 526	14, 551	359	1, 329	441	923	1, 003	0.8
llinois	1, 638, 260	1, 430, 676	207, 584	6, 245	979	4, 368	108, 538	23, 172	1.4
Haishs	1 8/0./03	747, 366	128, 397	2, 862	8, 593	2,706	58, 847		1.0
owa	778, 386	706, 196	72, 190	2, 862 1, 712	3 780	2, 340	17, 911	-R 084	-0.8
Kansas	594, 523	511, 384 295, 161	83, 139	1, 275	2,833	2,607		13, 300	2.8
Kentucky Louisiana	831, 002	295, 161	35, 841	681	2, 282	1,082	12,481	I 1. 846I	-0. ß
Louisiana	275, 283	230, 586	44, 697	518	209		22, 735	-5, 585	-2. Q
Maine	186, 157	148, 722	37, 435	1, 170	1,629	1, 239 5, 788	227, 723	1, 651 1, 829	0. 9 0. 6
Maryland Massachusetts Michigan	948 204	283, 870 743, 288	37, 832 102, 918	1, 941	2,000	8, 112	82, 468		3.5
Michigan	1 228 200	1, 161, 051	167, 158	4, 642 3, 530	1, 556 371		982, 798 70, 710	-66, 893	-4.8
Minnesota	732, 972	624, 902	108, 070	1, 825	3, 680	1, 991	10,710	2 573	
Mississippi	237, 094	203, 443	33, 651	217	5,00	4, 942		2, 573 -12, 917	-5. 2
Mississippi Missouri	761, 600	670, 145	91, 455	1, 746	2,086	2, 438	36, 221	4, 920	0.6
Montana	135, 168	109, 549	25, 619	242	1,640	575	412	-5, 219	-3.7
Nebraska	426, 229	367, 587	58,642	900	1,68	3, 251		8,003	1.9
Nevada	29, 645	23, 388	6, 257	74	54			-2, 270	-7.1
New Hampshire New Jersey	112, 183	93, 155	19.028	1, 132	48	600	130, 02	3, 303	3.0
New Jersey	852, 850	719, 696	133, 154	5, 998	8, 420	8, 207	1, 018, 33	20, 518	2. 5 7. 4
New Mexico New York	84, 150	70, 450	13, 700 340, 749	200 12, 355	20, 880		2, 900, 198	5,776 44,471	2.0
North Carolina	2, 307, 730 453, 241	1, 968, 981 397, 133	56, 108	1, 350	8,07		2, 900, 190	-30, 361	_6 3
North Dakota	183, 019	155, 383	27, 636	235	3,01			1 -5 027	-27
Obio	1, 759, 363	1, 555, 093		A 224	12 25				-0.4
Oklahoma	550, 33	490, 94	59, 384	J 1996	I K 931	0		1-20 460	-36
Oregon	252 12	3 234, 766	17, 357	1,348	3,00	517		-16, 884	-6.3
Pennsylvania	1, 753, 52	1, 534, 834		12,961	2, 47	3 10,704	2, 181, 00	1 20,238	1.2
Rhode Island	136, 42	116, 792	19, 631	770			156, 53	2,414	1.8
South Carolina	218, 402	192, 14	26, 261			1, 259	314, 70	-12,872	-5. €
South Dakota	205, 172	180, 19	24, 977	239				973 5, 828	0.5 1.6
Tennessee	368, 25	330, 430		1, 228	4, 55	0 070			1.3
Texas	1, 365, 890 113, 997	1, 159, 130 7 96, 120				5 3, 879 3 300	2,65	1, 336	1.2
Utah Vermont	86, 62	78, 39		524	1, 37	8 36	97, 69	-6, 406	-6. 9
Virginia	375, 88	318, 58		2,084					-2.9
Washington	1 44R 085	382, 87	63, 188	1, 998		9 4,738	85, 71	4 3, 721	0.8
West Virginia	266, 27	225, 900	40, 373	1.330	3,05	7 10,70	87, 60	6 –2,616	i — 1, 0
West Virginia Wisconsin	782, 56	877, 45	105, 110	2,666	5, 22	5 2,91	79.05	9 - 10.940	-1.4
Wyoming	61, 50	51, 57	9, 922	12	59	1 85	2	821	1.4
11 Journe									
Total		00 040 04	3, 480, 939	107, 81	1 173, 61	9 121, 78	9, 370, 88	5 22, 336	0.0

<sup>&</sup>lt;sup>1</sup> Includes 7,859 United States Government-owned cars at large not allocated to states.

Table 508 .- Motor-vehicle revenues, 1930, as reported by State authorities

		Motor	car regist receipts	ration		Dispo	sition of s	gross rece	ipts 1
State	Gross receipts	All motor cars	Passen- ger cars and busses	Trucks, etc.	Miscel- laneous receipts	Collec- tion costs	State high- ways	Local roads	On road bonds and miscel- laneous
	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars 226	1,000 dollars 890	1,000 dollars 741	1,000 dollars 1,943
AlabamaArizona	3, 800 735	540	313	227	195	226	735	741	1, 943
A rhansas	4, 284	4. 243			41	69	2,875		1,340
California Colorado Connecticut	9, 859	8,639	6, 202	2, 437	1, 220	1, 493	3, 388	3, 388	1,590
Colorado	1,901	1,785	1, 416 4, 878	363 1,476	116 1, 936	131 716	8 5 7,574	885	
Deleware	8, 290 1, 110	6, 354 864	-, 678 636	228	246	110	598		512
Delaware District of Columbia_	636	179	152	27	457	103			533
Florida	4,814	4,729	3, 546	1, 183 812	85	289 211	3, 394 4, 271	1, 131	
Florida. Georgia. IdahoIllinois. Indiana	4, 482 1, 998	4, 418 1, 959	3, 606 1, 549	410	64 39	60	194	1, 744	
Illinois	18, 444	17, 292	12, 858	4, 434	1, 152		10, 468		7, 976
Indiana	6, 347	5, 942	4, 533	1.409	405	327	6,020		l
Iowa	12, 694 6, 084	11,978	10, 251	1, 727	716	613 171	11, 956 4, 163	1,750	125
Iowa. Kansas. Kentucky Louislana. Maine. Maryland Massachusetts. Michigan.	5, 547	5, 376	4, 205	1, 171	171	275	4,686	586	
Louisiana	4, 609	4, 528			81	50	4, 550		
Maine	8, 167	2, 423	1, 815	608	744	317	1,443		1,407
Maryland	8, 438 7, 121	2,713 4,118	2, 303 2, 884	410 1, 234	725 3, 003	344 1,644	2, 475 4, 811		619 636
Michigan	22, 482	20, 772	15, 999	4,773	1,710	875	14, 525	6,000	1,082
Minnesota Mississippi		10, 926	8, 937	1,989	136		6,977		4,085
Mississippi	8, 046					160 499	241	2, 645	0 500
Missouri Montana	10, 150 1, 583	1, 503	1, 209	294	80	56	6, 079	1, 527	3,572
Nebraska	3, 805	8, 631	3, 117	514	174	117	1, 106	2, 582	
Nevels	374	287	206	81	87	14	190		170
New Hampshire	2, 290 15, 382	1, 868 11, 270	7, 241	4,029	422 4,112	175 1,034	2, 115 9, 362	4, 735	251
New Hampshire New Jersey New Mexico New York	1, 280	11, 270	(, 221	9, 020	2,110	78	445	201	553
New York	40, 858	36, 460	26, 546	9, 914	4, 398	2,663	28, 261	6, 088	3,846
North Carolina	0.836		:-::-			300	2,848		3,688
North Dakota Ohio		1,946 12,700	1, 518	428	13 587	77 507	1, 099 6, 383	783 6, 397	
Oblahama	6 596	12,100				256	2.358	3, 922	
Oregon	9,618	9,060	7,512	1, 548 7, 751	558	555	2, 296	5,316	3, 451
Pennsylvania	83, 112	23, 860	16, 109	7,751	9, 252	2,048	26, 514		4, 550
KAOGE ISISDO	2, 281 2, 878	1, 834 2, 581	1,350 2,130	484 451	447 297	250 41	2,014 2,681	17	156
Oregon Pennsylvania Rhode Island South Carolina South Dakots	2,960	2,901	2, 463	438	59	92	1,463	1,405	100
Tennessee	4,767					89	2, 221	2, 220	237
Texas	13,961	13, 061	9, 252	3, 809	900	844	4, 153	8,964	
Texas Utah Vermont Vrginia Washington West Virginia Wisconsin	856 2,392	2, 058	1,680	378	334	118	402 2, 392		836
Virginia.	6, 494	6, 235	5, 109	1, 126	259	212	6, 116		166
Washington	7,617	7, 354	5,745	1,609	263	188	5, 279	2,062	88
West Virginia	4, 703 13, 084	4, 295 12, 724	3, 332 9, 123	964	407	210	1,622		2, 871
Wyoming	692	12, 124	8, 128	3, 601	360	700	6, 898 692	5, 486	
Total	855, 705		1	1	1	19, 197	222, 147	68, 578	45, 783

 $<sup>^1</sup>$  These figures do not always agree with those shown on highway income tables, because of time of disposition and use of fiscal years.

Table 509.—Gasoline taxes, 1930, as reported by State authorities

		Dis	position o	f total tax	ses collect	ed		
State	Total tax (re- funds de-		Construc	tion, etc.	State and		Gallons consumed	Tax rate per
	ducted)	Collec- tion costs	State high- ways <sup>1</sup>	Local roads 1	road- bond pay- ments	Miscel- laneous	by motor vehicles	gal- lon
	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000	1,000	1,000	
Alabama	6, 902	aouars 34	1, 959	3, 440	dollars 1,469	dollars	gallons 172,537	Cents
Arizona	2,670		1, 683	987			172, 537 66, 750	4
Arkansas	6, 427	48	4, 505		1,803	71	128, 545	5
CaliforniaColorado	34, 870 6, 145	52 55	23, 212 4, 263	11, 606 1, 644		183	1, 162, 338 153, 621	3
Connecticut	4, 515	- 00	4, 515	1,022		700	223, 297	2
Delaware District of Columbia	1,013		864		149		33, 779	2 3 2
District of Columbia	1,600					1,600	79, 984	2
Florida	13, 655 13, 435	13 4	4, 541 8, 954	757	4, 540	3, 804	227, 037	6 6 5
Georgia Idaho	2, 731	13	2,674	2, 239	36	2, 238	223, 185 54, 423	Ď,
Illinois	27, 472	61	18, 274	9, 137			915. 747	3
Indiana	17, 159	41	12, 838	3, 210		1,070	428, 969 352, 802	4
Lowa	10, 584	32	5, 243	5, 309			352, 802	3
KansasKentucky	9, 121 8, 415	28	7,371 8,387	1,750			304, 016 168, 295	3
Louisiana	7, 546		5, 543		1,848	155	184, 782	3 3 5 5
Maine	4, 169	29	2,070	2,070	2,020		102, 737	4
Maryland	6, 991	9	5.526			1, 456	174, 780	4
Massachusetts		20	7,407	2,500	636		528, 147	2
Michigan Minnesota	10, 359	42	11,508 6,906	6, 624 3, 453	3,000	540	722, 463 345, 304	3
Mississippi	6, 918	7	2 242	3,855		208	135, 824	4 2 3 3 5 2
Missouri	8, 630	57	8, 582				431, 958	2
Montana	2,942	13	1 2 5 5 5 5				58, 888 226, 511	5
Nebraska	9, 060 675	7	6, 790 675	2, 263			226, 511	4
New Hampshire	2,499		1,874		625		16, 875 62, 487	4
New Hampshire Now Jersey	11, 380	19	11, 268			93	546, 685	l â
New Mexico	2, 762	55	1,843		864		54, 326 1, 438, 583	3 5
New Mexico New York North Carolina	28, 476		21, 320	5, 685	3, 688	1, 471	1, 438, 583	2
North Carolina North Dakota	12, 533 1, 972	25	8, 845 1, 290	645	3,088	12	250, 669 65, 643	5 3
Ohio			23, 176	7, 416		6, 489	927, 036	4
Oklahoma	12,092	62	9,022	3,008			302, 310	4
Oregon	6, 199	15	6, 184				154, 986	4
Pennsylvania	33, 624	279	25, 251 1, 302	4,644	8, 450 434		928, 842	3 2
Pennsylvania Rhode Island South Carolina	1,736 7,146		3,476	1, 191	2,479		86, 613 119, 072	8
South Dakota	3, 504	13	2,715	-1 202	776		87, 597	4
Tennessee	10,719	54	6,399	2, 133	2, 133		214, 384	5
Tevas	29, 527		22, 145			7, 382	738, 177	4
Utah	2, 106 1, 880	4	1,663 1,880		439		60, 138 46, 998	31/2
Vermont	10,775		7,543	3, 232			215, 501	5
Virginia Washington	7, 253		4,835	2,418			241, 775	3
West Virginia	0,307		2,687		2, 680		133, 966	4
Wisconsin	8.315	11	3,058	4, 647		599	415,742	2
Wyoming	1,447		1,085	362			36, 175	4
Total	494, 683	1, 102	338, 928	96, 225	31, 049	27, 379	14, 751, 309	3, 35

Board of Public Roads.

100446°-32-60

 $<sup>^{\</sup>rm I}$  These figures do not always agree with those shown on highway income tables because of time of disposition and use of fiscal years.

Table 510.—Annual average rate in cents per hour for common labor employed on Federal-aid highway projects, 1922-1931

Year	New Eng- land	Middle Atlan- tic	North	West North Central	South Atlan- tic	East South Central	West South Central	Moun- tain	Pacific	United States
1922	Cents per hour 40 53 49 46 49 49 51 50 45	Cents per hour 37 43 43 43 47 43 43 43 43 42 87	Cents per hour 33 41 40 37 38 39 39 39 39 38 38	Cents per hour 32 36 36 37 36 37 38 37 38	Cents per hour 21 27 28 27 29 28 26 28 26 28 25 22	Cents per hour 20 23 24 25 25 26 28 24 20	Cents per hour 24 25 27 26 28 31 28 23	Cents per hour 88 41 40 44 45 46 47 45	Cents per hour 49 54 53 52 53 52 53 52 53 51	Cents per hour 33 39 38 38 40 41 39 30 36

Table 511.—Fertilizer and fertilizer materials: Production, sales, and value in the United States, calendar years 1928–1930

		Quantity			Value	·
Item	1928	1929	1930	1928	1929	1930
Agricultural lime and liming materials sold.   Lime from limestone— Quicklime Hydrated Lime from oyster shells Limestone, pulverized Calcareous marl	Short tons 110, 533 223, 377 15, 371 2, 186, 870 61, 034	Short tons 89, 654 248, 675 14, 000 2, 654, 580 88, 990	Short tons } 343, 111	Dollars { 639, 615 1, 647, 943 126, 844 3, 153, 848 200, 704	Dollars 448, 634 1, 939, 267 119, 000 8, 764, 775 130, 866	Dollars } 2, 372, 779
Total	2, 597, 185	3, 045, 899		5, 768, 954	6, 402, 542	
Phosphate rock sold or used: <sup>1</sup> Florida— Hard rockLand pebble	Long tons 95, 918 2, 787, 528	Long tons 72,424 3,015,874	Long tons 81, 753 3, 166, 318	383, 672 9, 040, 350	267, 218 9, 633, 856	517, 229 10, 273, 076
Total	2, 883, 446	3, 088, 298	3, 248, 071	9, 424, 022	9, 901, 074	10, 790, 305
Tennessee  Brown and blue rock Other States	577, 095 8 40, 865	633, 939 4 38, 618	611, 045 4 67, 276	2, 856, 850 8 162, 307	3, 097, 104 4 155, 081	2, 938, 525 268, 000
Total phosphate rock	3, 501, 406	3, 760, 855	3, 926, 392	12, 443, 179	13, 153, 259	13, 996, 830
Sulphur produced Sulphur sold <sup>1</sup> Pyrites produced	1, 981, 878 2, 082, 924 312, 815	2, 362, 389 2, 437, 238 333, 465	2, 558, 981 1, 989, 917 347, 512	<sup>5</sup> 37, 500, 000 1, 081, 758	548, 800, 000 1, 250, 141	<sup>5</sup> 35, 800, 000 1, 028, 680

Bureau of Agricultural Economics. Compiled from annual reports of the Bureau of the Census. Figures for earlier years appear in previous issues of the Yearbook.

<sup>1</sup> Sold by producers.
2 Sold or used by producers.

Idaho and Wyoming.Idaho, Wyoming, and Montana.

Approximate.

Table 512.—Fertilizer: Consumption in the United States by states, 1920-1931

State and diwicion					Caler	idar yes	lr 1				
State and division	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930
Maine	1,000 short tons 168 17 220 61 10 875 2250 165 333	1,000 short tons 2 151 14 2 15 61 8 8 70 8 230 163 821	1.000 short tons 172 15 216 66 8 270 8 250 177 822	1,000 short tons 2 168 17 2 18 64 9 2 70 2 250 157 809	1,000 short tons 2 182 16 2 17 62 9 2 70 2 250 153 820	1,000 short tons 185 16 218 63 9 270 253 147 328	1,000 short tons 147 15 2 18 59 8 2 70 234 135 829	1,000 short tons 184 17 16 72 10 2 65 260 142 327	1,000 short tons 3 179 17 17 71 10 2 72 3 260 144 340	1,000 short tons 186 17 15 62 10 2 69 2 250 142 332	1,000 short tons 196 17 16 67 10 4 69 4 250 156 4 332
North Atlantic	1, 099	1, 033	1, 096	1,062	1, 079	1, 089	1.015	1, 093	1, 110	1, 083	1, 113
Ohio	300 232 8 15 113 12 8 5 8 4 93 8 13 1	255 188 2 12 83 13 2 4 8 8 51 8 4	311 209 14 86 14 8 6 8 4 50 8 4	303 198 17 84 15 7 3 4 52	321 192 17 95 15 3 8 47 3 5	322 226 25 109 12 3 9 3 6 64 2 4	305 228 25 105 16 11 6 6 57 8	313 240 8 26 117 23 11 6 7 56 8 8	321 221 31 150 33 14 2 10 65 9	339 250 38 153 41 13 217 59 510	327 224 41 4 130 51 15 2 25 60 5 6
North Central	788	614	699	686	708	778	762	802	855	922	882
Delawaro	62 172 465 35 1, 170 1, 099 1, 003 262	38 140 370 29 691 599 536 291	40 158 450 38 951 527 522 354	37 155 422 40 1,066 693 676 398	36 151 442 40 1, 183 844 679 365	41 165 452 41 1, 218 873 779 359	43 163 435 43 1, 218 840 780 399	41 165 408 44 1, 171 727 713 417	41 173 438 50 1,349 788 883 469	41 165 430 50 1,294 780 869 427	43 177 449 50 1, 242 749 929 487
South Atlantic	4, 268	2, 694	3, 038	3, 487	3, 740	3, 928	3, 921	3, 686	4, 191	4, 036	4, 126
Kentucky Tennessee 5 Alabama 4 Mississippi 4 Arkansas 5 Louisana 5 Oklahoma Texas 5	90 98 875 131 78 111 8 4 55	62 64 168 61 22 36 8 2 22	85 90 284 143 36 75 8 2 84	90 106 448 208 80 105 3 4 79	85 115 457 206 97 125 8 4 128	93 142 598 258 123 111 3 5 101	92 156 615 278 126 114 2 6 125	70 112 478 219 75 93 14 81	90 151 681 383 126 144 4 8 145	93 143 675 328 157 174 192	114 164 644 404 158 176 8 7 145
South Central	942	437	749	1, 120	1, 217	1, 431	1, 512	1, 132	1, 678	1,771	1, 812
Washington Oregon California Other States	3 6 3 6 66 2	<sup>3</sup> 5 <sup>3</sup> 6 73 1	2 4 8 8 75 1	2 5 3 8 72 2	3 7 3 8 66 2	* 10 * 8 86 3	12 1 8 94 4	14 8 9 103 4	<sup>8</sup> 16 <sup>9</sup> 10 121 4	* 17 * 10 130 6	<sup>8</sup> 17 <sup>2</sup> 10 142 8
Western	80	85	88	87	83	107	118	130	151	163	177
United States	7, 177	4, 863	5, 670	6, 442	6, 825	7, 333	7, 328	6, 843	7, 985	7,975	8, 110

Bureau of Agricultural Economics. Rearranged from latest revised report of the National Fertilizer Association, published in the Fertilizer Review May-June, 1931. Based on fertilizer tag sales or sale records or estimates, as shown in footnotes.

<sup>&</sup>lt;sup>1</sup> Except as follows: New Hampshire, Massachusetts, Idaho, and Oklahoma (1920-1927), year ended June 30; Rhode Island, year ended Mar. 31; New Jersey, year ended October 31.

<sup>2</sup> Estimated by State authorities.

<sup>3</sup> Estimated.

<sup>4</sup> Praliminary.

<sup>5</sup> Based on tag sales.

<sup>6</sup> Totals of 4 companies plus estimates for others.

Table 513.—Fertilizer and fertilizer materials: Production, consumption, imports, and exports, United States, 1926-1930

		O	alendar yea	r	
Item.	1926	1927	1928	1929	1930 1
Sulphate of ammonia (equivalent of all forms):  Production 2	4, 612 2, 058, 683 3, 799, 054 48, 536, 552	Short tons 717, 460 741, 886 19, 211 155, 335 838, 638 1, 656, 579 3, 756 2, 137, 129 3, 699, 579 1, 915, 913 76, 819 94, 722	42, 133 104, 177 1, 156, 860 2, 126, 860 13, 164 8, 500 2, 440, 121 4, 472, 341 1, 283, 732		Short tons 769, 022 746, 031 30, 160 91, 461 643, 881 2, 228, 588 4,59 2, 735 2, 476, 712 4, 530, 521 1, 404, 041 105, 810 98, 230
Imports for consumption— Kainit  Manure saits <sup>6</sup> Muriate of potash Sulphate of potash Other potash-bearing substances <sup>6</sup> Total imports for consumption	223, 049 78, 258 52, 357	115, 345 311, 357 183, 475 77, 172 10, 531 697, 880	119, 897 453, 242 261, 644 96, 833 12, 076 943, 692	85, 042 437, 727 258, 682 89, 051 706 871, 208	125, 455 405, 215 306, 017 96, 603 613 933, 938

Bureau of Agricultural Economics. Compiled from Annual Reports of the Bureau of the Census, Bureau of Foreign and Domestic Commerce, and the Bureau of Mines.

1 Subject to revision.

4 Quantity sold as superphosphate or used in manufactured goods sold.
5 Includes double manure salts and hard salts.
6 Includes ashes (wood), beet root, other potash-bearing substances (alunite, leucite, etc.), used for fertilizer.

Table 514.—Nitrogen: World production of, contained in inorganic nitrogenous materials, 1927-1931

	1								
Product	Quantity produced during year ended May 31-								
Froduct	1927	1928	1929	1930	1931 '				
By-product sulphate of ammonia.  Other by-product ammonia <sup>1</sup> C yanamide.  Synthetic sulphate of ammonia.  Nurate of lime.  Other synthetic nitrogen <sup>1</sup> Chilean nitrate of soda.  Total.	Short tons 361, 000 55, 300 198, 000 330, 000 89, 100 201, 700 219, 500 1, 454, 600	Short tons 404, 800 59, 400 224, 400 403, 700 115, 500 259, 600 429, 000 1, 896, 400	Short tons 413, 600 56, 100 231, 000 533, 500 149, 600 401, 500 539, 000 2, 324, 300	Short tons 460, 900 56, 500 290, 100 486, 300 143, 500 470, 000 510, 000 2, 423, 300	Short tons 395, 500 34, 000 221, 000 121, 600 432, 500 275, 000 1, 863, 600				

Bureau of Chemistry and Soils. British Sulphate of Ammonia Federation (Ltd.), annual report. Fer-tilizers are included in this table under the final form as sold, so that, for example, cyanamide if converted into sulphate of ammonia is included under synthetic sulphate of ammonia, or, if into ammophos, is included under other synthetic nitrogen.

<sup>&</sup>lt;sup>2</sup> By-product of coke ovens: Production from other sources (coal, gas, bone carbonizing, etc.) accounted for less than 5 per cent of the total production for these years.

<sup>3</sup> Fertilizer establishments only.

<sup>&</sup>lt;sup>1</sup> Including ammonia products used for industrial purposes and ammonia in mixed fertilizers.

TABLE 515 .- Insecticides and fungicides: Production, imports for consumption and domestic exports, 1926-1930

Item	1926	1927	1928	1929	1930
Arsenic, white: Production Imports for consumption Calcium arsenate: Production	Pounds 15, 406, 890 15, 363, 320	Pounds 35, 315, 999 25, 033, 649 27, 282, 326	Pounds 22, 305, 972	Pounds 41, 093, 066 26, 314, 042 31, 314, 176	Pounds 20, 942, 663
Imports for consumption Exports Lead arsenate: Production Imports for consumption	1, 057	3, 807 21, 527, 838	1, 323 1, 178, 702	3, 139, 633 29, 903, 552 200	6, 359 3, 177, 335
Exports Sulphate of copper: 3 Production Imports for consumption Exports	33, 353, 264 2, 558, 584 4, 798, 620	36, 039, 487 1, 978, 726 6, 206, 904	1, 093, 673 44, 463, 000 3, 611, 844 8, 666, 899	1, 563, 982 40, 258, 860 5, 388, 743 6, 419, 688	2, 270, 980 3 36, 937, 300 5, 964, 378 5, 061, 554
Tobacco extract, exports 4. Sodium arsenate, imports for consumption Prepared animal dips: Imports for consumption 4. Exports.	116, 262 119, 947	2, 297, 016 90, 454 102, 394	2, 386, 526 12, 403 175, 055	2, 294, 567 208, 770 2, 252, 644	1, 929, 171 94, 051 174, 215 1, 258, 139

Bureau of Agricultural Economics. Compiled from reports of the Bureau of the Census, Bureau of Mines and Bureau of Foreign and Domestic Commerce.

1 Year ended June 30. Not comparable with census years 1927, 1929, which cover more industries, therefore are more accurate.

2 Copper industry only. The total production as reported by the census for 1927 and 1929 was: 56,666,812 pounds and 79,187,343 pounds, respectively.

3 Estimated.

4 Nicotine sulphate and "Other tobacco extracts."

5 Classified as sheep dip.

TABLE 516.—Insecticides and fungicides: Average wholesale price per pound New York, 1919-1931 1

	7	a 1.	Lead a	rsenate	70-40	Bordeaux	mixture	Lime- sulphur
Calendar year	Arsenic, white	Calcium arsenate	Powder	Paste	Paris green	Powder	Paste	solution, per gallon
1919	Cents 9, 9 13, 8 7, 9 8, 9 14, 2 9, 4 5, 1 3, 8 4, 0 4, 4 4, 5 4, 5	Cents 19. 1 13. 7 16. 4 10. 6 7. 8 8 0 7. 5 6. 8 7 4 8. 1 6. 5	Cents 29. 9 28. 3 19. 4 14. 8 22. 2 20. 9 15. 6 14. 6 13. 8 14. 1 13. 5 14. 5	Cents 14.9 13.3 11.6 11.1 15.7 13.1 11.0 11.0	Cents 35. 8 36. 2 27. 0 22. 6 30. 4 28. 8 21. 5 118. 4 19. 2 27. 0 30. 9 35. 2 32. 5	Cents 16. 5 19. 3 17. 2 16. 8 22 0 16. 3 13. 2 11. 5 11. 5 11. 3 13. 0 12. 8	Cents 12 4 13. 2 10. 9 10. 8 16. 3 12. 5 11. 0 11. 0 10. 9 10. 7 13. 0 12. 8	Cents 19. 1 18. 8 16. 6 16. 5

Bureau of Agricultural Economics. Compiled from the Oil, Paint, and Drug Reporter.

<sup>1</sup> Year ended June 30. Not comparable with census years 1927, 1929, which cover more industries, there-

<sup>1</sup> Average of monthly range.

TABLE 517.—Number of marketing and purchasing associations, estimated membership, and estimated amount of business, by geographic divisions and States, 1980–31

-	Esti- mated busi- ness (thou- sands)	13, 000													
Nuts	Esti- mated mem- ber- ship	71 17, 000 \$13, 000													
	No.1 listed	Ľ													
ы	Esti- mated bust- ness (thou- sands)	400, 000 \$300, 000	170		100	4,000	2,000	2,000	117,000	19,	42,119 000,000	159, 200	සුසු	<u>ج</u> بي يې	*,0;,r;
Livestook	Esti- mated mem- ber- ship		140	40	100	410	130	280	178, 500	2,2	8,8,8, 888	195,900	කුකු	සූගු	7,7,8
	No.1 listed	2, 014	2	1	-	1	23	2	760		88 188	1, 139			584
	Esti- mated busi- ness (thou-	775, 000 \$621, 000	140	140		1, 920	1	830	150,950	8,5	88,85 25,85 25,85 25,85 35,85	381, 460	<b>Æ</b> E	ងខ្ល	8,8,4, 86,88
Grain	Esti- mated mem- ber- ship		300	300		960		860	225, 200	84	82,83 16,830	467, 400	7.4 82,	<b>Æ</b>	9,2,29 90,29 70,50
	No.1 listed	8,448	1	1		3		2	006		445 90 72	2,179			347 347 855
etables	Estlinated business (thousands)	\$319,000	3,800	585	8	12,830	5,370	₹.	15,440	5, 060 160	3,8 8,800 8,040	10, 630	2,850	2, 400,	8, 120 920 920
Fruits and vegetables	Esti- mated mem- ber- ship	182, 000	1,810	5284	1,230	10, 640	6,600	1,710	13,060	1,800	1,9,4 0008 0008	14, 920	4	7,	1, 1,280 400
Fruits	No.1 listed	1,386	æ	5	13	88	285	38	120	41	ននត	110	2300	200	NE-60
6	Esti- mated busi- ness (thou- sands)	\$1,200													
Forage	Esti- mated mem- ber- ship	1,000												Ш	
	No.1 listed	· ·												Ш	
tuots	Esti- mated busi- ness (thou- sands)	725, 000 \$820, 000	68,090	1.00	188 t	된	124, 500	40,000	180, 620	2,0	34.27 200 100 100 100	139, 660	200	, r. j.	
Dairy products	Esti- mated mem- ber- ship	1 -	36, 250	•	24, 48 05, 176 05, 176	, 18,	61,800	47, 100	208, 650	8,5	2,55 2,55 3,55 3,55 3,55 3,55 3,55 3,55	296, 910	114,88	<u>Ģ</u> , 65,	18, 780 69, 100 1, 880
Ä	No.1 listed	2,391	99	600	3544	72	42	8	1,066	88	222 223	1,009	257	<b>48</b>	880
n and cotton roducts	Esti- mated busi- ness (thou- sands)	90, 000 \$130, 000										300		300	
ton and product	Esti- mated mem- ber- ship	=										150		150	
Cotton	No.1 listed	8										4		4	
	Geographic division and State	United States	New England	Maine. New Hampshire.	Massachusetts Rhode Island	Middle Atlantic	New York	Pennsylvania	East North Central	Obio Indiana	Illinois. Michigan. Wisconsin	West North Central.	Minnesota	Missouri North Dakota	South Darota Nebraska Kansas

380	120	5 <sup>5</sup> 09	340	140 200	180	244			12,090	810
4,810	2, 550	1,920	1,270	320	620	988			10,300	870
Ħ	8	H∞	9	বিক	E	निचळ			411	28.
1,240	56	8 88	3, 920	250 250 930 40	1,990	220 1, 400	4, 000	850 1130 8, 000	8,390	160 160 8, 220
5,840	1,600	1,28	6, 260	2,1,4 3000 3000 3000	2,380	1, 190 270 900	4, 560	2, 930 230 1, 300	7, 030	1, 080 6, 800
83	1-8	वृत्त चित	33	1-1-00	12	8 6 6	27	1201-0	1	104
1,970	1,860	9	280	928	33, 120	1, 470 15, 300 11, 230	25, 960	10, 820 5, 180 8, 180 8, 180 100	25, 220	14, 100 2, 220 8, 900
9,350	9, 200	ଷ	610	470 140 140	30, 270	24, 200 5, 200 26, 200	28,000	10, 40 10, 40 10, 100 10, 800 10, 800	12,920	7, 700 8, 220 8, 000
9	<b>4</b> H		4	0104	188	8888	143	277 ct 2 4 L	8	822
41, 260	1, 680 9, 140	22, 380 22, 000	6,380	2, 300 1, 500 1, 630	14,350	8, 740 4, 540 5, 620	26, 190	1, 920 1, 820 1, 370 1, 170 1, 670 1, 670	188, 120	22, 410 13, 110 152, 600
28, 420	3, 160	4,4,9 9,550 000 000 000 000 000 000 000 000 000	12, 500	8.4.4.4.4.4.0.00 0.0000 0.000 000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.	19, 100	8,300 1,100 4,500	21,050	2, 1, 1, 4, 200 11, 300 1, 300 1, 300 1, 600 1, 600 1, 600	60, 500	9, 550 7, 950 43, 000
200	44 85	8446	ਲ	다하면국 다	157	8218	16	20 4 <del>2</del> 8 2 2 2 2	486	74 092 360
					116	116	645	15 425 205	97	440
					200	200	200	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	300	300
					2	61	4	1601	SA	61
16, 640	9, 050 5, 450 1, 430 70	10	2,560	1, 190 700 700	1, 570	1, 130	7, 790	650 5, 350 130 220 1, 130	43, 570	14, 650 5, 340 23, 580
12,850	4, 150 1, 250 4, 010 20	3, 850	7,360	2,6 880 250 840	5, 570	2,870	19,860	2, 550 11, 260 2, 850 2, 850 20 20 20 2, 440	33, 650	16, 200 8, 350 10, 100
83	121	7	24	4566	16	9	41	133 72 8	88	26 24 24
28, 200		9, 20 12, 800 12, 200	35, 000	6,800 9,700 18,500	64, 100	7, 200 14, 200 42, 600	1, 600	1, 600	800	800
33, 000		12, 900 14, 900	50,000	6, 400 30, 500 13, 100	104, 500	2, 100 6, 400 47, 100	1,650	1, 100	700	700
43		88.8	26	140	182	7283	2	NOW.	H	1
South Atlantic	Delaware Maryland Dist. Columbia Virginia	North Carolina. South Carolina. Georgia. Florida.	East South Central.	Kentucky Tennessee	West South Central.	Arkansas Louisians Oklahoma	Mountain	Montana Idaho Wyoning Wooning Colorado Arkona Utah Nevada	Pacific	Washington Oregon California

1 Including federations, sales agencles, and subsidiaries.

Table 517.—Number of marketing and purchasing associations, estimated membership, and estimated amount of business, by geographic divisions and states, 1930-31—Continued

									5								
Poult	rry and I	oultry	-	Tobacco		W00]	and M	ohair	Miscel	laneous	selling	Misce	Haneous	buying		Totals	
No. listed	Esti- mated mem- ber- ship	Esti- mated busi- ness (thou- sands)	No. Hsted	Esti- mated mem- ber- ship	Estl- mated busi- ness (thou- sands)	No. 1	Esti- mated mem- ber- ship	Esti- mated busi- ness (thou- sands)	No. listed	Esti- mated mem- ber- ship	Estl- mated busi- ness (thou- sands)	No. Ested	Esti- mated mem- ber- ship	Estl- mated busi- ness (thou- sands)	Num- ber listed	Estimated member- ship	Esti- mated busi- ness (thou- sands)
160		\$86,000	13	40,000	\$7,000	136	64, 000	\$26,000	474	132,000	\$61, 800	1, 588	392, 000	\$215,000	11,960	3, 000, 000 \$2, 400, 000	2, 400, 000
4	520	1, 190	-			8	830	8	16	800	540	16	47,250	21,880	88	87,900	90,870
- 6	8 8	870				1 9	02 02	8 8	8 087	99 99 99 99	8 588	80-50	2, 2, 200 0, 2, 200 0, 0, 2, 200 0, 0, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2,	3,750 2,020 14,000	24880	9, 160 7,7,750 61,330 64,440	2,11,2,5,000 11,2,600 17,730 10,000 1
, E	8	7,880	1	8	\$	3	8,300	310	ষ	8, 780	2, 530	5 <b>8</b>	61, 250	50,070	# 18	190, 130	244,080
04	420	6, 370	0	100	40	8 8	2,600	130	13	850 330 2, 600	1,130	888	45, 100 5, 550 10, 600	41, 400 3, 810 4, 880	847	115,660 8,630 65,840	181,390 8,790 53,900
S	8, 210	1,300	2	9,000	2,200	8	8,400	1,540	112	39, 790	13,490	336	83, 200	41, 130	3,301	774, 010	523, 670
- <del>4</del> 8	1, 620 900 500 100	990 900 900 900 900 900 900 900 900 900	A I A	2,000	2,200	-8 -8	6, 200 1, 050	1,38 88 85	8.1157.88	1, 400 3, 740 19, 950 8, 550 6, 150	1,580 1,860 1,310 6,100 2,640	888 2411	16, 500 20, 500 7, 300 19, 000	7,300 10,180 7,130 4,120 12,400	361 332 955 1, 260	139, 390 105, 340 236, 650 128, 000 166, 630	90, 630 192, 220 75, 970 117, 580
R	19,230	11,520	П	300	92	21	29,000	2,330	146	38,890	20, 290	642	128,850	55,030	6,285	1, 191, 550	780, 470
-u2 4	30 650 16, 600 1, 950	11,150		300	93	11386	15, 200 15, 200 2, 500 2, 000	380 270 230 650 650	1082405	2,500 29,650 1,630 1,630 2,210	1,380 13,850 1,180 1,180 1,620	171 130 88 88 88 88	37, 500 28, 500 19, 800 11, 800 11, 900	11, 430 11, 320 15, 500 1, 1440 8, 650 4, 530	1, 533 1, 150 1, 150 1, 150 1, 150 1, 153 1,	289, 580 281, 860 176, 200 101, 890 178, 840 84, 090	193, 980 188, 030 94, 580 66, 050 56, 760 95, 660 87, 410
	Poult 180 190 4 100 140 150 150 150 150 150 150 150 150 150 15	Poultry and product product product product product listed listed ber-  14	Ty and Poult products products and Poult masted but masted but masted but masted but ber- (the ship saud poult saud but ber- (the ship saud but ber- (the ship saud but ber- (the ship saud but ber- (the ship saud but ber- (the ship saud but ber- (the ship saud but ber- (the ship saud but ber- (the ship saud but ber- (the ship saud but ber- (the ship saud but ber- (the ship saud but but ber- (the ship saud but but but but but but but but but but	Eatl	Earl   Earl	Earl   Earl	Earl   Earl	Earl   Earl	Eastleangle   Eastleangle	Eastleant   East	Eastleant   East	East- match   East- match	Early mate   Ear	Early mate   Ear	East-   East	East.   East	Products

119,070		60, 380 112, 250 13, 990 23, 990	132, 515	6, 250 18, 860 35, 260 72, 145	97, 395	17, 700 17, 980 17, 980 4, 870 8, 445 16, 320 16, 320 660	351, 550	75, 470 26, 280 249, 800
134, 590	25, 690 28, 350 28, 350 22, 350 112, 690 11, 980 11, 980	145, 450 32, 830 83, 830 30, 860	195, 860	14, 290 24, 850 81, 600 76, 120	118, 280	25, 73, 25, 25, 25, 25, 25, 25, 25, 25, 25, 25	162, 230	47, 730 28, 190 86, 310
472	47-15588877. 13788883417	8 8888	619	22.4 23.0 23.8 21.8	400	25 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	88	\$215 <u>8</u>
13,090	2,810 7,740 800 1,030 1,350	4, 840 1, 040 8, 120 240 240	6, 400	1, 180 1, 180 1, 960 2, 890	3, 370	630 480 1, 190 230 120 100	19, 130	3,380 15,000
15,300	8,350 1,100 1000 1000 1000 1000	12, 210 8, 150 1, 040 1, 640	18, 560	1,440 9,410 3,000 4,710	9,400	1,360 2,300 3,700 8,740 280 870 870	5,980	950 4, 300
87	71 401	80000	67	2282	45	점요4급성원관	28	25.22 25.22
11,010	2, 280 2, 300 6, 140 6, 140	5, 520 1, 180 2, 630 1, 680	3,980	270 610 1, 950 1, 150	3,780	1,380 820 820 920 90 180	99	350270
10,660	1, 280 1, 480 1, 480 1, 310 1, 310	21, 980 8, 380 5, 840 12, 250	8, 180	2, 810 1, 130 3, 460	6,580	2, 430 1, 230 1, 230 1, 020 1, 020	1,340	888
*	1 2881-74	8817.8	30	4054	8	20002444	77	4.00
100	8 09	280 120 90	5,810	10	13,030	2, 200 2, 200 320 320 310	2, 530	1,780
2,330	1,800	8, 360 1, 250 2, 000 110	3,380	160	9,710	3,500 1,050 1,500 1,720 1,300 1,720	3,710	3,400
7	8 18	201 202	80	N O	31	Ö Ø 44 4 4 4	*	HOH
4,280	3, 520	450						
9,800	5,300	20,800						
ম		70 10						
920	17.0 180 180 180 180 180	8 8888	830	3838	10,940	210 210 210 200 100 200 200 200 200 200	50,600	20,870 2,340 27,390
2,230	866	10, 100 190 190 190 190 190	3,140	8388	16,970	6, 200 9, 200 1, 410 1, 410 9, 610 9,	25,800	81,800 000,000
72	140000	1 2040	2	<u>8084</u>	8	5422448	2	2007
South Atlantic	Delaware Maryland District of Columbia Virginia West Virginia North Carolina Georgia Florida	East South Central Kentucky Tennessee Alabama	West South Central	Arkansas. Louisians. Oklahoma. Texas.	Mountain	Montana Idaho Waming Colorado New Mexico Arizona Utah Newada	Pacific.,	Washington Oregon California

Table 518.—Associations marketing dairy products: Number listed and estimated business, 1925, 1926, 1928, 1929, and 1930

		amery dations	me	eese- king lations	trib	k-dis- uting iations	gai	k-bar- ning iations		llaneous ations 1		l asso- tions
Calendar year	List- ed	Esti- mated busi- ness	List- ed	Esti- mated busi- ness	List- ed	Esti- mated busi- ness	List- ed	Esti- mated busi- ness	List- ed	Esti- mated busi- ness <sup>2</sup>	List- ed	Esti- mated busi- ness
1925 1926 1928 1929 1930	Num- ber 1,400 1,390 1,400 1,385 1,385	dollars 222, 000 230, 000 245, 000 264, 804	751 740 717	32, 000 30, 000 27, 931	119 114 111	dollars 160, 000 135, 000	40 47 50	dollars	179 199 195	dollars 3, 000 11, 000 15, 000 19, 320	2, 500 2, 458	1,000 dollars 535,000 600,000 640,000 680,000 640,000

## Federal Farm Board.

Table 519.—Number of active wheat pools, quantity of wheat handled, and percentage which pool wheat was of total wheat, 1921-22 to 1928-29

Marketing season	Pools reporting	Wheat received by pools	Percent- age pool wheat is of total wheat 1	Marketing season	Pools reporting	Wheat received by pools	Percentage pool wheat is of total wheat 1
1921-22 1922-23 1923-24 1924-25 1925-26	Number 3 10 11 10 9	Bushels 11, 372, 768 20, 293, 610 24, 446, 621 27, 967, 244 16, 823, 560	Per cent 2.3 8.5 4.8 4.4 8.5	1926-27 1927-28 1928-29 1929-30 1930-31	Number 9 8 7 8 9	Bushels 17, 494, 726 12, 335, 546 14, 879, 859 17, 573, 537 24, 206, 974	Per cent 3.0 1.9 2.2 3.1 4.7

#### Federal Farm Board.

Table 520.—Cooperative citrus-fruit shipments and such shipments as a percentage of production for specified areas, 1920-21 to 1930-31

		3	Packed boxe	s handled	by associa	tions in—	•	
Marketing season	Californ Arızo		Alabam Flori		Te	K88	United	States
1920-21. 1921-22. 1922-23. 1923-24. 1924-25. 1925-26. 1926-27. 1927-22. 1928-29. 1929-30.	Bores 21, 806, 253 12, 847, 455 19, 810, 048 21, 671, 344 17, 685, 860 23, 011, 773 26, 427, 062 28, 129, 643 22, 930, 811 31, 879, 555	Per cent 1 81.8 74.8 82.5 69.1 74.2 71.7 69.3 72.8 67.1 72.5 77.1	Boxes 3, 905, 841 3, 908, 395 5, 443, 758 5, 548, 241 6, 375, 759 4, 198, 316 4, 880, 948 3, 876, 577 5, 268, 739 5, 549, 105 10, 277, 883	Per cent 1 27. 9 27. 6 30. 3 25. 8 31. 6 25. 4 26. 0 28. 5 32. 2 38. 8	Bozes 26, 570 65, 690 38, 624 95, 053 124, 115 262, 459 463, 043 363, 430	87. 4 29. 5 18. 4 26. 4 23. 9 31. 2 32. 2 45. 0	Baxes 25, 712, 094 16, 755, 850 25, 253, 806 27, 246, 155 24, 077, 309 27, 243, 713 30, 383, 063 25, 811, 518 39, 660, 841 28, 982, 969 42, 517, 868	Per cent 1 63. 2 53. 3 59. 9 51. 3 54. 4 55. 7 54. 4 55. 2 57. 3 46. 0

### Federal Farm Board.

<sup>&</sup>lt;sup>1</sup> Including federations, sales agencies, warehouse associations, associations manufacturing ice cream,

milk powder, etc.

Not including amounts reported by federations, sales agencies, etc.

In subsequent years these were included among the miscellaneous associations.

<sup>&</sup>lt;sup>1</sup> Shipped out of country where grown. Yearbook, 1931: 592, Table 11.

<sup>&</sup>lt;sup>1</sup> Per cent of production for the specified area.

Table 521.—Livestock handled, sales, and purchases by terminal market cooperative sales agencies, 1918-1981

				Recei	pts of 1	livest	ock 1			Livestock	purchased
Calendar year	Asso- tion repor	18	Cattle calv		Ho	ţs	Sheep		'Total <sup>2</sup>	Associa- tions reporting	Animals
1918		3 4 4 6 16 23 26 28 28 28 30 34	63 85 163	, 528 , 876 , 313 , 361 , 982 , 326 , 241 , 014 , 094 , 599 , 066 , 411	381 536	, 483 , 127 , 380 , 095 , 016 , 437 , 070 , 084 , 296 ), 561 3, 413 1, 184	Number 7, 5, 23, 6, 29, 6, 103, 1, 352, 8, 733, 1, 202, 6, 1, 558, 4, 688, 2, 609, 2, 969, 4	548 540 576 101 552 516 311 582 465 589 136 504	Number 189, 283 503, 383 748, 255 1, 310, 628 4, 727, 056 9, 933, 445 11, 382, 304 10, 666, 066 10, 333, 307 10, 426, 12( 11, 921, 90) 12, 051, 386 11, 957, 744	2 2 3 4 8 8 14 18 18 21 18 20 22	288, 150 328, 016 280, 808 325, 267 577, 646 723, 422
		Tota	l livesto	ock ha	ndled					Value of bus	iness handled
Calendar yes	er.	ti	oria- ons orting	Ani	mals 4		due of ales <sup>3</sup>	VE	lue of pur- chases	Associa- tions reporting	Total <sup>5</sup>
1018			mber 8 4 4 6 6 10 23 26 28 28 28 30 34	13 57 1, 3 4, 8 10, 0 11, 6 10, 9 10, 6 10, 7 12, 3 5 12, 7	mber 39, 535 71, 887 54, 805 52, 660 13, 406 37, 373 24, 343 54, 219 61, 323 93, 681 39, 000 55, 647 55, 647	12 35 37 35 101 191 271 278 148 279 302 263	ollars 384, 348 ,178, 255 ,119, 935 ,309, 401 ,818, 588 ,954, 106 ,872, 776 ,797, 282 ,900, 462 ,674, 261 ,894, 934 ,679, 996 ,288, 784		Dollars 15, 901 622, 385 458, 824 894, 972 8, 069, 638 4, 631, 630 5, 222, 121 7, 923, 372 8, 249, 106 8, 741, 163 11, 627, 701 10, 008, 169 6, 766, 706	Number 4 6 6 18 23 24 24 24 28 28 30 34	Dollare 12, 400, 249 35, 800, 590 37, 878, 759 36, 204, 373 104, 838, 226 196, 904, 508 236, 594, 897 279, 720, 654 233, 249, 470 274, 200, 285 289, 152, 931 314, 522, 635 273, 688, 165 180, 601, 072

#### Federal Farm Board.

1 Includes some animals sold for yard traders.
2 Includes animals not segregated by kind.
3 Includes animals handled from producers to feeders.
4 Includes transactions for yard traders.
6 Includes business not classified as sales or purchases.

Table 522.—Cooperative extension workers: Number employed, United States, June 30, 1930, and June 30, 1931

											,	
State or Territory	Cou agricu agent assis	s and	Cou home onstr agent assis	dem- ation s and	ageni	inty ub is and tants	trator	inis- s and visors	ma	ject tter alists	Tot all a	al of gents
	1930	1931	1930	1931	1930	1931	1930	1931	1930	1981	1930	1931
AlabamaAlaska	No. 88	No. 92	No. 57	No. 58	No.	No.	No. 13	No. 13 3	No. 18	No. 25	No. 176	No. 188 3
Arizona Arkansas California Colorado Connecticut Delaware Florida Georgia Hawaii Idaho Ilinois Indiana Iowa Kansas Kentucky Louisiana Maune Maryland Massachusetts Michigan Minnesota Missistippi Missouri Montana Nebraska New Hampshire New Jersey New Merico New York North Carolina North Dakota Ohio Oklahoma Cregon Pennsylvania Forto Rico Rhode Island South Carolina South Carolina South Dakota Tennassee Texas Utah Vermont	667 67 90 67 88 45 111 23 20 76 105 85 71 85 20 20 20 20 20 13 41 20 20 13 20 20 20 31 20 31 32 32 32 32 32 32 32 32 32 32 32 32 32	17 78 86 83 33 100 8 85 110 8 86 66 77 111 123 3 104 8 8 8 8 8 47 7 8 8 8 8 8 8 7 8 7 8 8 8 8	6 67 30 9 8 8 3 40 88 4 7 7 7 8 8 222 12 260 414 224 15 9 9 114 78 18 110 5 9 22 22 13 7 7 6 6 6 6 1 1 1 1 6 6 1 1 1 1 5 5 2	7 68 28 28 3 39 96 6 5 7 7 212 224 4 226 18 8 17 73 18 12 19 112 25 63 66 67 7 44 53 146 66 110 55 55 55 55 55	22 3 8 8 8 5 7 7 16 33 3 10 8 8 8 8 5 11 11 11 11 11 11 11 11 11 11 11 11 1	133 8 8 7 7 100 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	3 14 12 5 5 5 3 3 12 12 12 12 12 17 16 6 6 7 7 18 14 19 10 0 5 5 5 5 5 5 12 2 26 6 4 5 18 11 16 6 12 2 26 6 12 12 12 12 12 12 12 12 12 12 12 12 12	10 5 5 8 8 12 2 18 8 8 12 19 10 10 10 10 10 10 10 10 10 10 10 10 10	9 16 20 20 13 12 1 1 3 1 3 1 5 5 5 5 1 9 9 3 1 1 5 5 5 5 8 2 2 1 1 7 4 4 5 6 5 8 8 1 5 6 8 1 1 6 8 1 6 8 1	4 18 23 14 25 5 13 3 88 8 20 31 31 30 37 37 19 9 35 5 18 60 33 31 84 11 9 7 71 24 4 26 20 24 4 4 1 5 5 29 9 17 24 4 21 14 9 9 6	32 180 56 56 56 17 115 280 164 151 162 164 151 163 167 162 164 151 163 167 162 164 163 167 162 164 163 167 162 164 163 163 167 168 168 168 168 168 168 168 168 168 168	31 1799 1471 163 611 113 2271 116 61 190 191 172 173 179 185 185 185 185 185 185 185 185 185 185
Washington West Virginia Wisconsin Wyoming	36 43 57 21	36 44 55 22	10 21 4 10	12 25 4 10	5 4 8	5 15 8	3 13 12 4	3 11 12 4	9 24 40 13	10 19 43 14	63 105 121 48	66 114 122 50
Total	2, 755	2, 783	1, 352	1,410	247	251	488	495	1, 100	1, 222	5, 942	6, 161

Extension Service.

<sup>&</sup>lt;sup>1</sup> Includes both white and negro extension workers.

Table 523.—Cooperative extension work: Projects and percentage of agents' and specialists' 1 time devoted to each, 1925-1930

Project	1925	1926	1927	1928	1929	1
Farm crops Horticulture Forestry Animal husbandry Darry husbandry Poultry husbandry Rural engineering Rodents and insects Agricultural economics Foods and nutrition Child care and training Clothing Home management Home management	6.9 0.5 7.1 7.0 8.7 3.7 2.0 3.9 7.1	P. ct. 5.3 13.1 7.5 7.5 7.1 9.0 3.6 1.7 4.0 7.1 1.5	P. ct. 4.8 12.4 17.0.9 8.22 7.8 8.44 1.5 1.1 6.8 1.2 0.9 1.2 0	P. ct. 5.1 11.5 7.8 8.7 8.1 3.3 4.0 7.0 6.8 1.7 2.4	P. ct. 5.1 11.6 7.0 1.0 7.6 8.6 7.9 3.2 1.1 4.3 7.5	P
Home health and sanitation Community activities Miscellaneous projects Building extension program Organization	1. 2 6. 2 16. 6	1, 2 5, 9 16, 0	1, 2 6, 0 16, 3	1. 2 5. 8 17. 0	1. 2 5. 9 16. 3	

Extension Service.

Table 524.—Extension activities and accomplishments, 1925-1930, as reported by all county extension agents

Activity or accomplishment relating to extension	1925	1926	1927	1928	1929	1930
Total number of— Farm visits made. Home visits made. Office calls received Telephone calls received News articles or stories published Individual letters written. Different circular letters prepared Bulletins distributed. Radio talks made. Events at which exhibits were shown. Training meetings held for local lead- ers. Method demonstration meetings held Meetings at result demonstrations. Tours conducted. Achievement days held. Encampments held. All meetings held. Total attendance at all meetings held. Voluntary local leaders assisting with— Adult extension. Junior extension.	8, 269 27, 887	387, 724 3, 340, 22, 333, 286 4, 015, 126 3, 938 20, 109 387, 051 599, 797 19, 735, 616 644, 784 173, 122	396, 093 3, 600, 448 2, 476, 572 434, 271 4, 208, 801 5, 120, 763 3, 963 38, 064 398, 061 3, 145 636, 588 21, 421, 376 772, 185	432, 433 8,687, 570, 899 871, 331 4, 510, 657 5, 608, 604 8, 999 42, 902 437, 993 21, 951, 317 851, 526 179, 559	Number 1, 633, 154 459, 204 3, 991, 725 2, 710, 723 423, 600 4, 712, 940 6, 345, 488 9, 826 41, 604 486, 398	Number 1, 758, 743 548, 208 4, 317, 565 3, 015, 707 449, 834 4, 501, 988 24, 561 6, 657, 561 4, 148 20, 476 42, 903 { 402, 403 6, 368 6, 368 6, 729 25, 605, 485 334, 182 233, 043 85, 344
Adult home demonstration groups Members of such groups						34, 939 646, 340

Extension Service.

<sup>1</sup> Only field work of specialists as reported by county extension agents is included.

Table 525.—4-H club work: Number of clubs, enrollment, projects completed, etc., 1925-1930

Item	1925	1926	1927	1928	1929	1930
Junior clubs	Number 41, 286	Number 41, 234	Number 44, 188	Number 46, 671	Number 52, 180	Number 56, 180
Different boys enrolled Different gris enrolled	224, 633 340, 413	234, 078 352, 078	249, 553 370, 159	270, 534 393, 406	303, 509 452, 587	333, 197 489, 517
Total enrollment	565, 046	586, 156	619, 712	663, 940	756, 096	822, 714
Different boys completing Different girls completing	133, 076 196, 498	145, 202 223, 103	153, 324 245, 783	175, 069 272, 510	201, 910 305, 577	222, 472 331, 873
Total completing	329, 574	368, 305	399, 107	447, 579	507, <del>4</del> 87	554, 345
Projects started	24, 629 4, 549 29, 854 62, 577 308 17, 142 31, 250 52, 795 6, 841 105, 856 39, 259 128, 970 6, 477 22, 268	24, 107 4, 988 30, 458 81, 494 730 19, 094 37, 409 52, 730 6, 139 131, 121 39, 071	776, 029 25, 789 5, 253 25, 228 88, 922 2, 192 23, 076	1, 466, 584 882, 795 26, 977 6, 137 36, 475 112, 296 48, 233 56, 900 162, 291 16, 309 36, 274 56, 342 56, 342 56, 590 162, 291 16, 309 36, 274 56, 342 56, 342	995, 262 29, 197 7, 559 40, 380 124, 459 3, 852 37, 218 54, 227 60, 020 7, 379 182, 877 65, 652	57, 790

#### Extension Service.

TABLE 526.—Imports and price per pound of raw silk and production, imports and price per pound of rayon yarn, United States, 1921-1931

	Raw silk		Rayon yarn			
Calendar year	Net imports 1			Net im- ports <sup>3</sup>	Average price 4	
		Average price i	Produc- tion		150 A denier	300 A denier
1921	1,000 pounds 51,846 57,827 61,511 59,626 76,003 76,870 85,036 87,172 96,848 80,581 87,608	Dollars 6, 035 7, 219 8, 228 5, 917 6, 341 5, 937 5, 100 4, 859 5, 4, 777 8, 173 5, 2, 233	1,000 pounds 15,000 24,406 36,477 37,720 51,902 63,648 75,555 97,901 121,566 110,208 144,350	1,000 pounds 3,419 2,993 6,515 6,569 12,363 13,918 17,740 15,113 20,318 6,009 3,460	Dollars 2. 671 2. 800 2. 800 2. 113 2. 004 1. 810 1. 489 1. 500 1. 246 1. 059 . 758	Dollars 2. 479 2. 650 2. 650 1. 871 1. 754 1. 603 1. 289 1. 300 1. 073 - 900 - 636

Bureau of Agricultural Economics. Compiled from annual issues of Commerce and Navigation of United States Department of Commerce, except production of rayon yarn which is from Yearbook of the Department of Commerce. Prices are from bulletins of the U. S. Bureau of Labor Statistics.

<sup>1</sup> Boys' and girls' club members completing.

Net imports are imports minus reexports.
 Average of monthly average prices of Japanese Kansai, No. 1.
 Net imports are imports minus reexports 1921–1924. Subsequent years are imports minus exports and

A verage of monthly average prices. The count indicates the number of deniers or one-half decigram units, in weight, of a standard length of 450 meters. Since the standard is based on an arbitrary fixed length and a variable weight, the finer the yarn the smaller the count; 150 denier count, a size commonly used, is fine and 300 denier count is coarse.

A verage of monthly average prices of Japanese Best, No. 1 x 13-15.

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